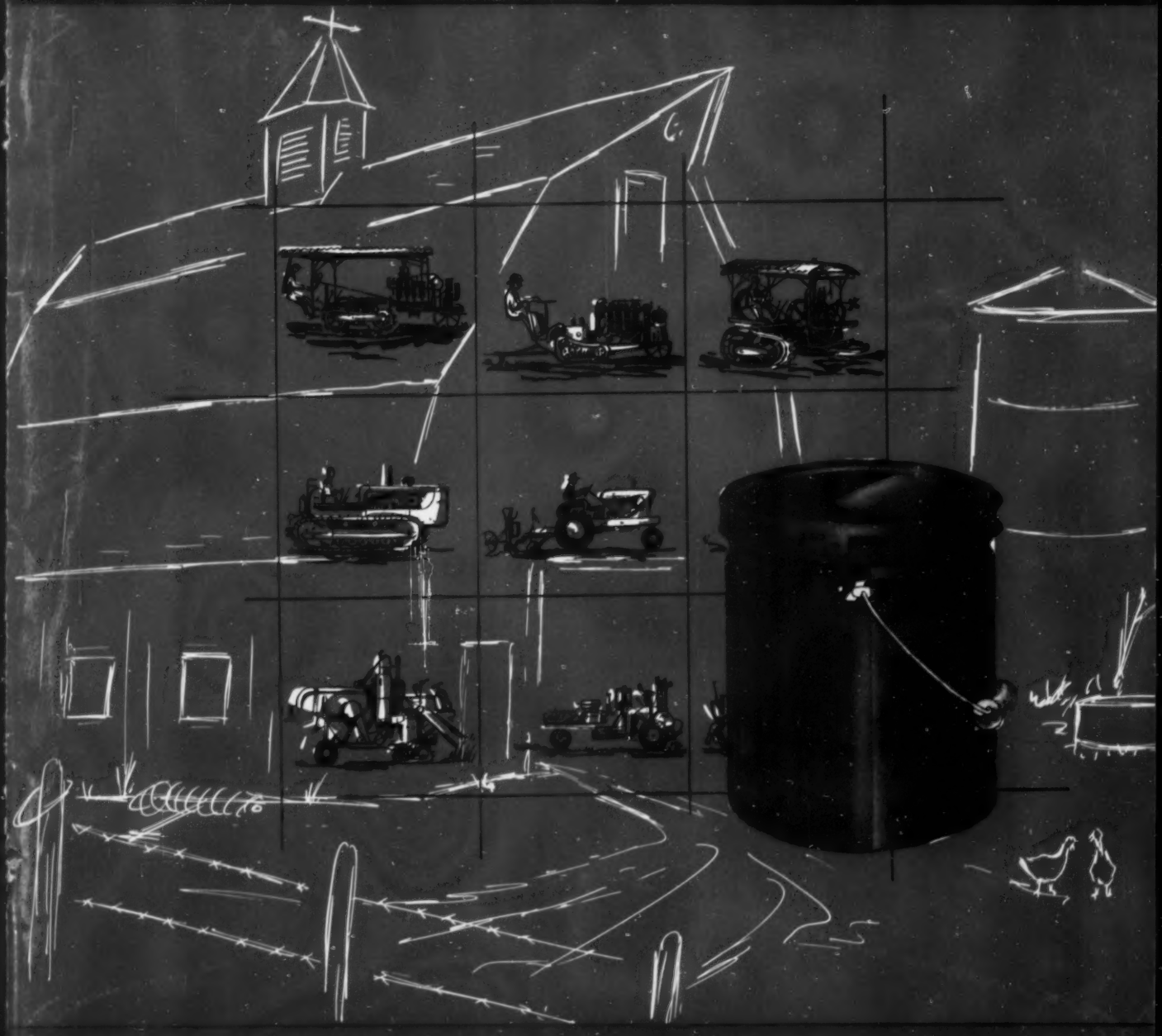
MAY • 1954

NLGI Spokesman

Journal of National Lubricating Grease Institute



Special Farm Lubrication Issue . . . Pages 9 through 26

PROTECTION is our business, too

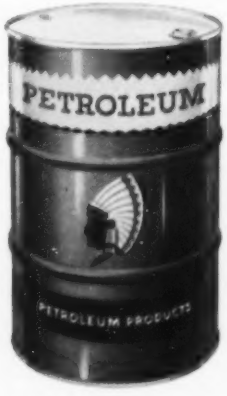
Just as valiant firemen are on around-the-clock alert to protect your life and property—J&L Steel Containers protect your products by providing dependable packaging that assures safety in transportation and storage. Their precise fabrication assures accuracy in all fittings and closures.

J&L drums and pails are chemically cleaned and dried by the JaLizing process. This assures a clean and dry, rust-inhibiting surface and increases the adherence and durability of decoration and interior lining.

Special protective interior linings are available to provide the best possible packaging for your products.

Jal-Coat, J&L's lithographing process, applies your trademark and sales message to the finished container . . . *no side seam touch-up is ever required.*

Plants located at Atlanta, Ga.; Bayonne, N. J.; Cleveland, Ohio; Kansas City, Kansas; Lancaster, Pa.; New Orleans, La.; Philadelphia, Pa.; Port Arthur, Texas; and Toledo, Ohio.



Jal-Coat, J&L's exclusive lithographing process, adds sales appeal to your products.

J&L STEEL

Jones & Laughlin
STEEL CORPORATION · PITTSBURGH

CONTAINER DIVISION
405 LEXINGTON AVE., NEW YORK 17, N. Y.

FOUR-WAY SOLUTION TO IMPROVED PROPERTIES

...in your lubricating oils and greases

WITCO...

LEAD NAPHTHENATES

30% and 33% lead

Witco Lead Naphthenates are completely soluble in petroleum solvents and oils. They show extreme pressure properties whether used as a single additive or in combination with other additives.

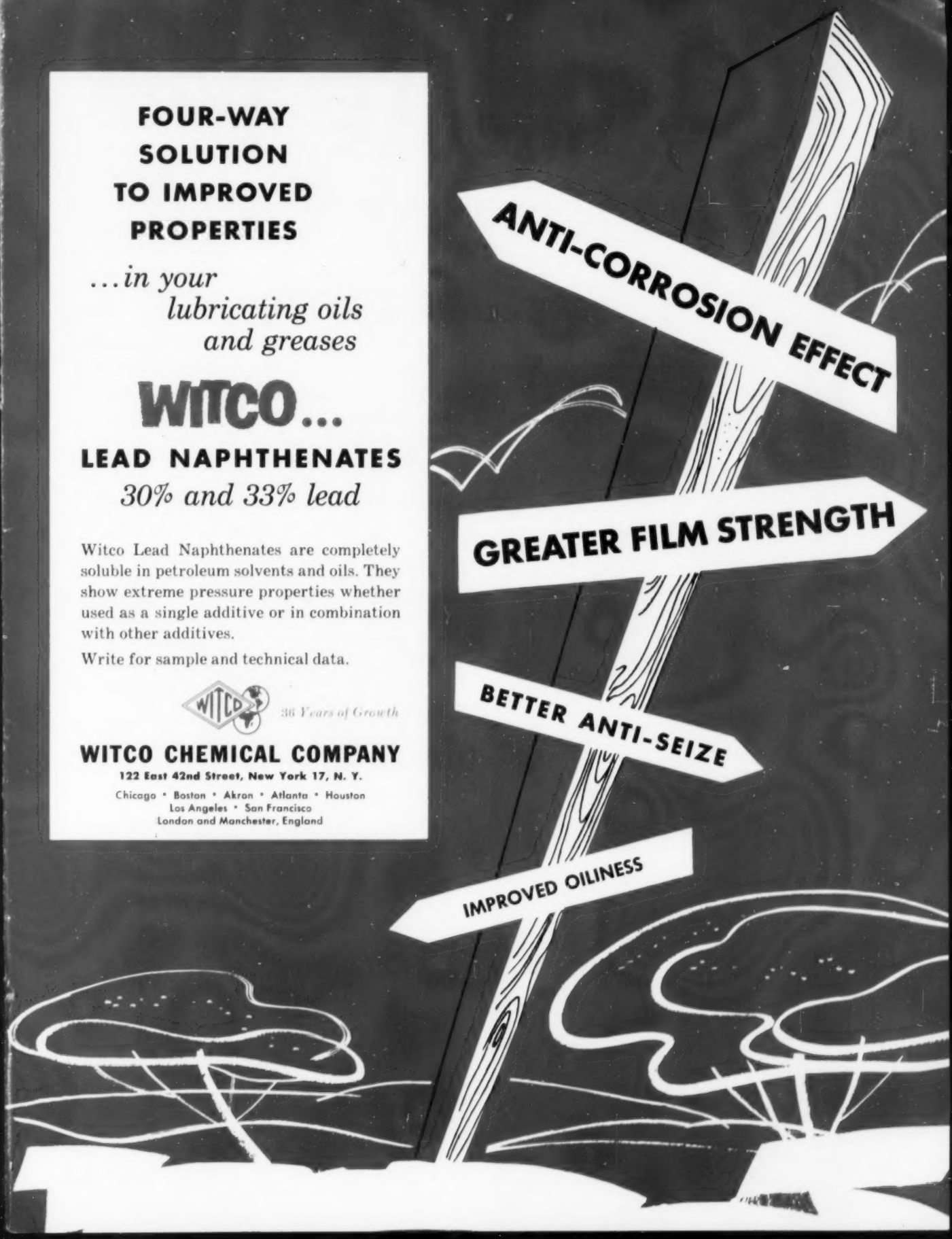
Write for sample and technical data.

WITCO *36 Years of Growth*

WITCO CHEMICAL COMPANY

122 East 42nd Street, New York 17, N. Y.

Chicago • Boston • Akron • Atlanta • Houston
Los Angeles • San Francisco
London and Manchester, England



President's page

by W. M. MURRAY, President, NLGI

The Executive Secretary and His Staff

President Murray Introduces You to the People in Your NLGI National Office

This month I would like to say more about the Executive Secretary . . . Mr. T. W. Miller of Kansas City. Tom comes to the Institute with an extensive background of public relations, publications and organizational experience which began in the editorial department of the Kansas City *Star* while he was a college student. For five year he was Editor of Publications in the advertising and sales promotion department of a national food concern, followed by two years in the marketing department of the Skelly Oil Com-

NEW Executive Secretary T. W. Miller will manage the Institute national offices in Kansas City, Mo.

pany, where he supervised public relations and publications. More recently he served as Executive Secretary to Kansas City's Advertising and Sales Executives Club . . . the largest organization of its kind in the nation, with more than 1,400 members.

A member of the Press Club and on the Board of Directors of the Kansas City Public Relations Society of Kansas City, Tom lists hunting and photography as his main hobbies, with two small children taking a great deal of his time. A man who genuinely enjoys people, I think you'll like working with Tom Miller.

This is a good opportunity to introduce two other staff members. Both of these ladies have proved themselves efficient and capable in their Institute duties and I commend them to you.

Miss Joan Swarthout serves as Assistant Editor on the *Spokesman*. With an educational background which includes Briarcliff Junior College, George Washington University, the Sorborne and Alliance Francaise, this young lady joined our organization after a stint as Assistant Editor at Magazine Management, New York. Incidentally, Joan's knowledge of French is of value to the Institute in handling the growing volume of foreign inquiries.

Mr. Miller's secretary and good right hand is Mrs. Sally Rencher, who brings a wealth of experience to NLGI from Spencer Aircraft in Seattle and Greenlease Cadillac in Kansas City. Adept in all phases of office procedure and techniques, Sally rounds out the team of the Executive Secretary . . . three able persons who are anxious to serve you.

Consider these few paragraphs as a short and general introduction. To really benefit, it is necessary that you personally meet these fine people. Why don't you arrange to visit the Institute office the next time you are in Kansas City? They are always glad to have new ideas.

HER experience is valuable to NLGI . . . Mrs. Sally Rencher, secretary, and expert on business procedures.

ASSISTANT Editor and responsible for the prize-winning appearance of the SPOKESMAN . . . Miss Joan Swarthout.

STRUTHERS WELLS

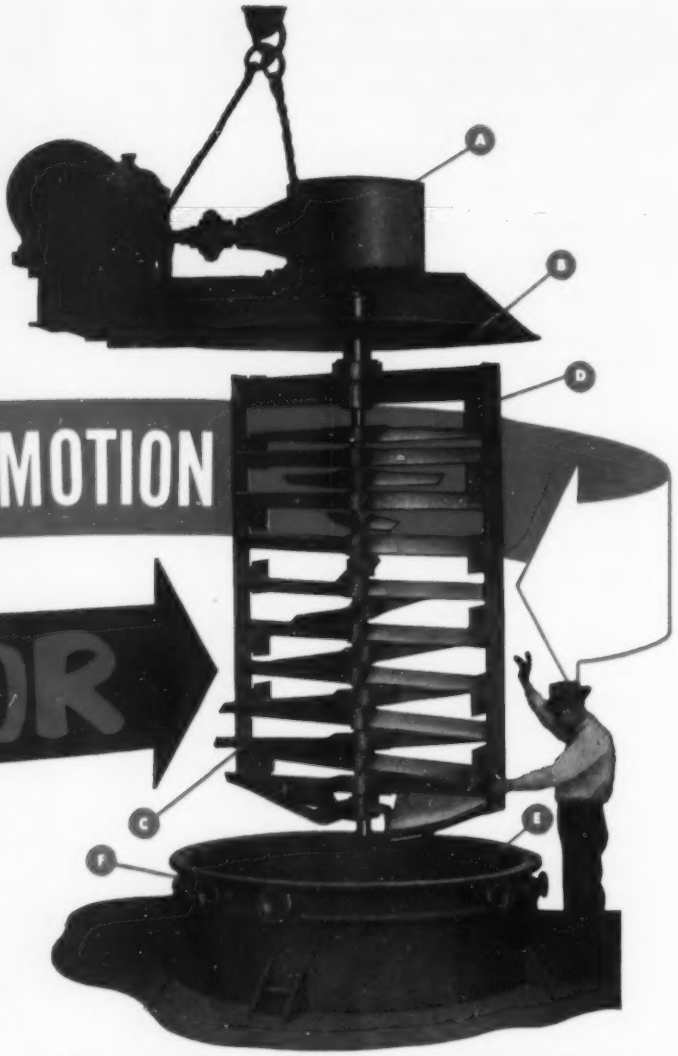
MIXING VESSEL

FOR PROCESSING

HEAVY VISCOUS

MATERIALS

Struthers Wells DOUBLE MOTION AGITATOR



- **A** — **Double motion drivehead, an exclusive Struthers Wells design. Horsepowers from 2 to 150. Furnished with sealing devices when used on pressure kettles.**
- **B** — **Kettles can be open flat top, or dished and flanged closed top for working pressures as high as 300 lbs.**
- **C** — **Sweep and paddle arms are pitched to create flow of material throughout kettle—preventing stratifying of the mix. Scraper frame and paddle arms can be of welded design or bolted for easy removal when vessel is equipped with a cover.**
- **D** — **Scraper blades are advanced hinged type, which insures positive scraping action on 98% of the inside surface of mixer.**
- **E** — **Mixer can be fabricated of steel or special alloy to meet specifications.**
- **F** — **Kettles furnished with jacket or unjacketed for possible direct fire application.**

For speed, economy and dependability—specify the Struthers Wells Double Motion Mixing Vessels—for processing greases and other heavy viscous materials. Our extensive machine shops and fabricating facilities—combined with years of engineering experience in designing all types of agitating vessels, enable us to furnish mixing equipment for any material, to your most rigid specifications.

For intricately designed or standard mixing equipment—*think first of Struthers Wells.*

STRUTHERS WELLS PRODUCTS

PROCESSING EQUIPMENT DIVISION

Crystallizers . . . Direct Fired Heaters . . . Evaporators . . . Heat Exchangers . . . Mixing and Blending Units . . . Quick Opening Doors . . . Special Carbon and Alloy Processing Vessels . . . Synthesis Converters

BOILER DIVISION

BOILERS for Power and Heat . . . High and Low Pressure . . . Water Tube . . . Fire Tube . . . Package Units

FORGE DIVISION

Crankshafts . . . Pressure Vessels . . . Hydraulic Cylinders . . . Shafting . . . Straightening and Back-up Rolls

MACHINERY DIVISION

MACHINERY for Sheet and Structural Metal Forming . . . Tangent Benders . . . Folding Machines . . . Roller Table and Tumble Die Bending Machines . . . Press Brakes . . . Punching and Notching Machines . . . Forming Dies

STRUTHERS WELLS *Corporation*

Struthers Wells

WARREN, PA.

PLANTS AT WARREN, PA. AND TITUSVILLE, PA.

Offices in Principal Cities

Published monthly by
National Lubricating Grease Institute
Tom Miller, *Editor*
Joan Swarthout, *Assistant Editor*
4638 J. C. Nichols Parkway
Kansas City 12, Mo.
1 Year Subscription $2.50
1 Year Subscription (Foreign) ..$3.25

NLGI Spokesman

Vol. XX MAY, 1956 No. 2

OFFICERS

President: W. M. Murray, Deep Rock Oil Co., Kerr-McGee Building, Oklahoma City, Okla.
Vice-President: J. W. Lane, Socony Mobil Oil Co., Inc., 26 Broadway, New York 4, N. Y.
Treasurer: A. J. Daniel, Battenfeld Grease and Oil Corp., 3148 Roanoke Road, Kansas City, Mo.
Executive Secretary: T. W. Miller, 4638 Nichols Parkway, Kansas City, Mo.

DIRECTORS

W. W. Albright, Standard Oil Co. (Indiana), 910 S. Michigan, Chicago, Ill.
D. P. Clark, Gulf Oil Co., Gulf Building, Pittsburgh, Pa.
R. Cubicciotti, L. Sonneborn Sons, Inc., 300 Fourth Avenue, New York, N. Y.
A. J. Daniel, Battenfeld Grease and Oil Corp., 3148 Roanoke Rd., Kansas City, Mo.
H. P. Ferguson, Standard Oil Co. of Ohio, Midland Bldg., Cleveland 15, Ohio.
F. R. Hart, Standard Oil Co. of California, 225 Bush Street, San Francisco, Calif.
H. L. Hemmingway, The Pure Oil Co., 35 E. Wacker Drive, Chicago, Ill.
C. L. Johnson, Jesco Lubricants Co., P. O. Box 7331, North Kansas City, Mo.
George Landis, Atlantic Refining Co., 260 S. Broad Street, Philadelphia 1, Pa.
J. W. Lane, Socony Mobil Oil Co., Inc., 26 Broadway, New York 4, N. Y.
H. A. Mayor, Jr., Southwest Grease and Oil Co., 220 W. Waterman, Wichita, Kans.
G. E. Merkle, Fiske Brothers Refining Co., 129 Lockwood Avenue, Newark 5, N. J.
W. M. Murray, Deep Rock Oil Co., Kerr-McGee Bldg., Oklahoma City, Okla.
G. A. Olsen, Sunland Refining Corp., P. O. Box 1512, Fresno, Calif.
F. E. Rosenstiehl, The Texas Co., 135 East 42nd Street, New York 20, N. Y.
W. H. Saunders, Jr., International Lubricant Corp., New Orleans, La.
J. V. Starr, Esso Standard Oil Co., 15 West 51st Street, New York 19, N. Y.
B. G. Symon, Shell Oil Co., Inc., 50 West 50th, New York 20, N. Y.

The National Lubricating Grease Institute assumes no responsibility for the statements and opinions advanced by contributors to its publications. Views expressed in the editorials are those of the editors and do not necessarily represent the official position of the N L G I. Copyright 1956. The National Lubricating Grease Institute.

IN THIS ISSUE

Page

PRESIDENT'S PAGE 4
by W. M. Murray, Deep Rock Oil Company
ABOUT THE COVER 7
FARM LUBRICATION PANEL DISCUSSION
Introduction 9
by M. L. Carter, Southwest Grease & Oil Company
Modern Farm Machines Need Modern Greases 10
by N. A. Sauter, Deere & Co.
Let's Modernize Lubrication of Modern Farm Machinery 14
by Wendell Bowers, University of Illinois
Lubrication Equipment for Modern Farm Machinery 16
by Owen L. Bandy, Lincoln Engineering Co.
Farmer Preferences in Agricultural Lubricating Greases 20
by Dale Hull, Iowa State College
Contribution of Lubricating Grease Industry to Lubrication of Modern Farm Machinery 24
by C. J. Boner, Battenfeld Grease & Oil Co.
Conclusion 26
by M. L. Carter, Southwest Grease & Oil Co.
COMMON DENOMINATORS FOR AUTOMOTIVE CHASSIS GREASES 28
by T. G. Roehner and E. L. Armstrong, Socony Mobil Laboratories
CHASSIS LUBRICANTS—A FEW PHYSICAL FACTS OF LIFE 34
by J. B. Stucker, Pure Oil Company
PATENTS AND DEVELOPMENTS 40
ALPHA MOLYKOTE CORP. JOINS 45
PEOPLE IN THE INDUSTRY 46
INDUSTRY NEWS 50
FUTURE MEETINGS OF THE INDUSTRY 61
TECHNICAL COMMITTEE COLUMN 62

ABOUT THE COVER

This month our cover depicts PROGRESS . . . progress in the design and efficiency of farm machinery. This tremendous advance over the last twenty-five years has been a challenge to our industry, requiring rapid progress in the production and application of lubricating grease. Farm machines must have proper lubrication to prevent costly breakdown, and the more complex machinery requires more points of lubrication and bearings require higher pressure.

Will centralized lubrication be the future ideal for farm machinery? You'll find out by reading the Farm Lubrication series, pages 9 through 26, of this issue.

Please enter my order for ____ copies of Bound Volume No. 19 of the NLGI SPOKESMAN at $6.00 each.

Name _____

Company _____

Street _____

City and State _____

Mail this coupon to

NATIONAL LUBRICATING GREASE INSTITUTE

4638 Nichols Parkway

Kansas City 12, Missouri

Bound Volume No. 19 of the NLGI SPOKESMAN is now on sale. All 12 copies published from April, 1955, through March, 1956.

$6.00 Complete

Attractively bound, lettered in gold on the front cover and binding. A permanent and authentic reference book for your library.

FARM LUBRICATION

PANEL members left to right: C. J. Boner, J. W. Lane, panel chairman M. L. Carter, N. A. Sauter, O. L. Bandy, W. L. Bowers and D. O. Hull.

PANEL DISCUSSION: Lubricating Greases for Modern Farm Machinery

Introduction, M. L. CARTER

The tremendous improvement in farm machinery over the last twenty-five years has brought a real problem to the lubricating grease industry. The new machinery requires new lubrication methods. The NLGI program committee has watched these developments for many years and has decided the time is right to bring this problem before the Association in a Form of Panel Discussion. The panel is titled, "Lubricating Greases for Modern Farm Machinery." It is common knowledge that twenty-five years ago most of the farm machinery was slow moving, horse drawn equipment. Ordinary cup grease, machine oil and axle grease were all that were required to lubricate most of the equipment. Today this is no longer true; the farms are larger, and many new types of machines which need modern lubricants are now being used to get higher and higher production from the soil. To get this production, millions of gallons of lubricating oils and thousands of pounds of different kinds of lubricating greases are being used on the farm yearly. To completely cover the subject of Modern Greases for Modern Farm Machinery, the program committee felt that a panel discussion covering various phases of this subject would be very desirable. This was accomplished by selecting panel members from the following fields:

1. Farm machinery manufacturers
2. Dispensing equipment manufacturers
3. Lubricating Grease Manufacturers
4. Representatives from agricultural college extension departments who have continuous contact with the farmers and their problems.

The following papers indicate that we must acquaint ourselves with the lubricating problems of the farmers and work with them to give them the lubricant as well as the package which they demand.

The following five articles comprise the Panel Discussion presented at the NLGI Annual Meeting, October, 1955

FARM LUBRICATION - 1

Modern Farm Machines NEED Modern Greases

By N. A. Sauter
Deere & Company
Moline, Illinois

The farm implements of today are becoming more and more precision machines. Speeds are higher, loads are greater and operating conditions are generally very severe as equipment of this type may operate in extreme dust or in water. Oil-impregnated wood bearings are now the exception rather than the rule; more and more antifriction bearings are being used and at increasingly higher speeds. It is not at all uncommon to have ball bearings operating at 3600 rpm.

The trend of decreasing farm population and increasing acreage per farm is making the farmer's time more valuable. Therefore, anything that the farm equipment designer can do to increase capacity or to decrease downtime are moves in the right direction. Keeping the time required to lubricate a machine at a minimum and having greases that have long service life are means of decreasing downtime which are of most concern to this group. Historically, the farm machinery manufacturer has not had much concern as regards to greases used in implements as the requirements were very nominal and most any grease was better than none. Implements were designed to use one of the three basic types of automotive greases which were available to the retail market These types are as follows:

1. Wheel bearing grease
2. Chassis or gun grease
3. Water pump grease

As a background to study how the above greases meet the needs of modern machines, the service requirements for a modern farm grease are listed below:

1. It should have good pumpability particularly at lower temperatures so that it is possible to grease equipment easily even in cold weather.
2. It should be suitable over a wide range of temperatures.
3. It should be stable at temperatures of the order of 150/160 F which may be normally encountered when ambient temperatures are high.
4. It should be suitable for high speed antifriction bearings as well as for plain bearings.
5. It should not soften and leak out of bearings and gear cases and it should assist in excluding dirt and water.
6. It should develop minimum fluid friction so as not to cause power losses and high operating temperatures.
7. It should afford protection against rusting.

In the first three columns of Figure 1 the conventional automotive greases are rated. The ratings are necessarily based on the writer's appraisal of greases with which he has had contact and no doubt there are greases in the same family which are better or worse than the rating given. It is also recognized that there may be seasonal grades of various lubricants.

On the basis of overall performance, wheel bearing greases perhaps represent the best choice except for the important fact that they are difficult, if not impossible, to handle in a grease gun. The chassis greases are the next best choice and are perhaps the most widely used, however, it appears that there are wide variations in

THIS mechanical cotton picker is one of the more highly publicized developments in agricultural engineering. *Photo courtesy Deere and company.*

quality. The writer feels that this group has three inherent deficiencies that serve to limit its suitability for the modern farm machine:

1. Structural instability at 160 F
   This perhaps is the most serious drawback and has been particularly a problem with aluminum soap greases on machines operating in the south, southwest and west where the temperature of the machine standing in the sun can reach 120 F.
2. Poor characteristics for high speed antifriction bearings.
3. Poor resistance to mechanical working
   The latter property adversely affects the frequency of lubrication and the sealing out of contamination.

Water pump greases represent the least suitable of the three types for reason of poor pumpability.

From the standpoint of modern farm machines, what are known as "multi-purpose" greases seem to be much better adapted. It is not implied that multi-purpose greases are not without deficiencies as there is no commercial product in such a state of development. However, it appears that they come the closest to meeting the requirements of modern farm machines and the writer would like to encourage greater availability and marketing effort for these greases. It should be pointed out that it is believed that there is a certain amount of latitude in the matter of selection of soap type in that for farm machines; lithium, anhydrous lime, smooth soda-lime and smooth soda greases have been found to be satisfactory. Data is included in the last column of Figure 1 to show how in general terms the multi-purpose greases compare with conventional automotive types.

Another factor that is in the picture is the matter of greasing equipment and its effect on grease selection. No attempt was made to survey the field, however, it appears that in many instances, grease is purchased on its ability to be handled in certain dispensing equipment. It would seem that this is fundamentally wrong and that grease selection should be made on the basis of the requirements of the parts to be lubricated. As an example, this situation seems to develop in corn picking time in the Corn Belt and even dispensing of multi-purpose greases with good pumpability becomes a problem at around 20 F when using 10 foot lines. The result has been that the farmer who is using multi-purpose grease will discontinue it in favor of a light gun grease, usually a conventional lime soap type, which means that shear stability is sacrificed and grease in bearing housings and gear boxes is likely to be mixed. For this reason, it may be logical to consider the need for a winter grade multi-purpose grease.

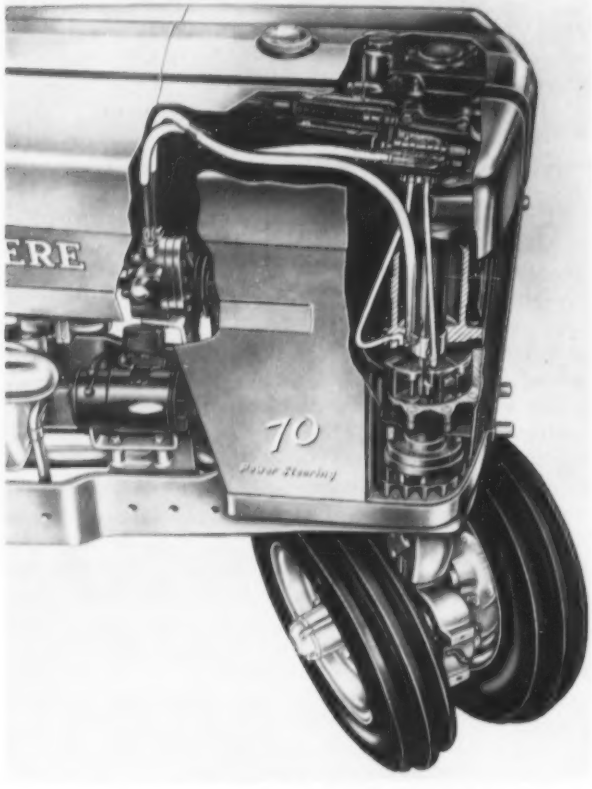
Performance Advantages

It is the writer's opinion that it is wrong to infer that the advantage of a multi-purpose grease to the user is merely not having to store several greases by virtue of the fact that a multi-purpose grease has more versatility. This is true, but the point is that the multi-purpose grease affords more performance advantages than the older types. It is also the writer's opinion that multi-purpose greases actually serve a much more useful purpose in farm machines than in passenger cars. Notwithstanding, there seems to be some reluctance to make these greases available to the farm trade.

Continued on next page

Wider distribution of multi-purpose greases would seem to have a beneficial effect in the long run in that more production would probably cause further reduction in prices of these greases and warehousing and selling would seem to be simplified.

There is another side to this picture in that the farm machinery manufacturer has an extremely difficult job to do when it comes to making recommendations to the user. It is against the policy of most implement companies to use trade names, for obvious reasons, so that greases are described in a general way, such as "Heavy Duty Chassis Lubricant," "Pressure Gun Grease," and "Good Grade of Gun Grease." In some instances detailed specifications are given but these are generally not understood by the farmer. The need for some standardization of terminology and pumpability ratings would seem to be even more important now with the more widespread use of multi-purpose greases and dispensing

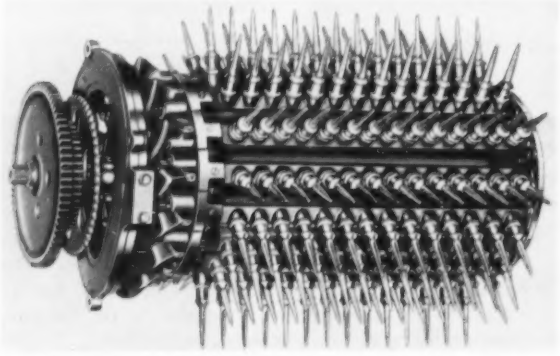


CUTAWAY view of the power steering unit in a Model 70 John Deere tractor. This type mechanism requires a high order of precision lubrication.

equipment. It would seem that the type of service classifications worked out for motor oils by API might be paralleled with respect to grease terminology.

The preceding discussion proposes to show (1) it is not necessarily logical to try to adapt conventional automotive greases to implement needs, (2) that developments in the field of multi-purpose greases are timely in relation to improvements in farm machines, (3) continuing work in the area of dispensing and pumpability

VIEW of individual 2500 rpm spindles (top) and picker bar. Good results have been obtained with greases developed particularly for these spindles but use of grease in this application should be considered experimental.



A CLOSE-UP of the picking drum.

would seem in order, and (4) the need for service designations and pumpability ratings for grease which would be of practical value to the builder and to the user.

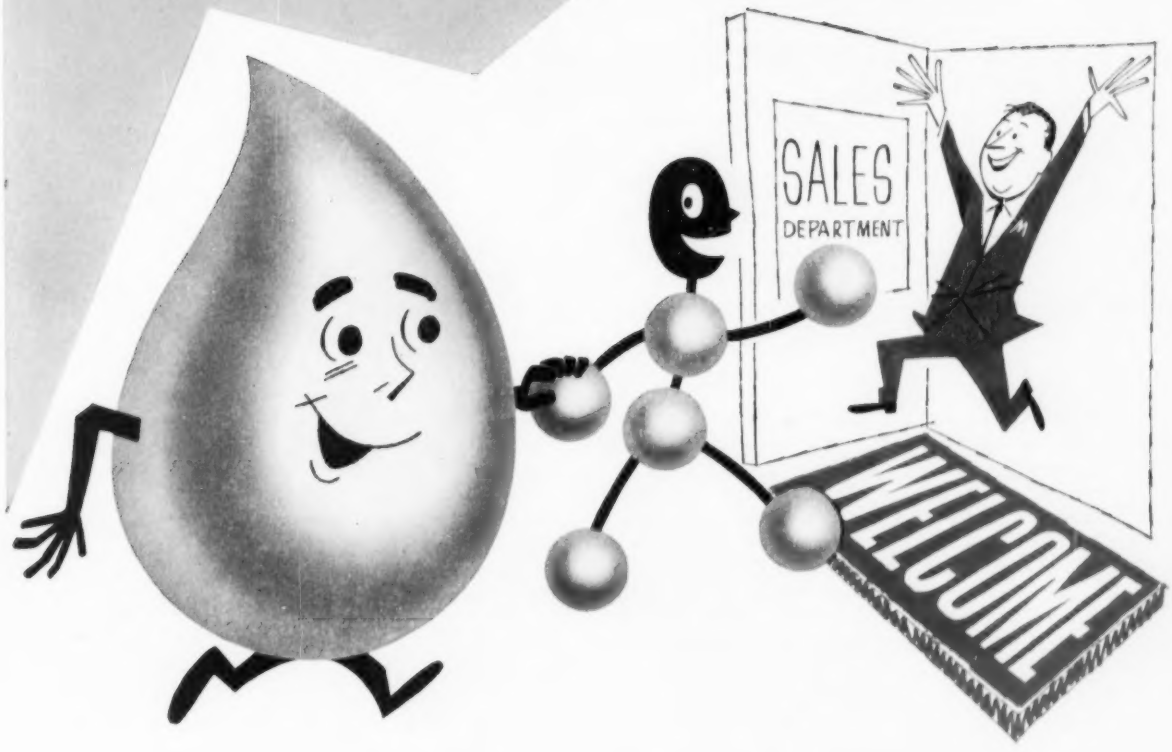
FIGURE 1

Grease Comparative Chart

Characteristic	*Wheel Bearing*	*Chassis*	*Water Pump*	*Multi-Purpose*
1. Pumpability when cold	F	G - P	P	G - F
2. Stability for				
(a) 0-160 F (Implements)	F	F - P	F - P	G
(b) Minus 20-160 F (Tractors)	F - P	F - P	F - P	G
3. Suitability at 160 F	G	F - P	F - P	G
4. Suitability for				
(a) Plain Bearings	G	G	F	G - F
(b) High Speed Anti-friction Bearings	G - F	P	P	G - F
5. Consistency Stability	F - P	P	P	G
6. Fluid Friction	F - P	G - F	G	G
7. Rust Protection	G	G - P	F - P	G - P
Overall Performance Rating				
(1) Average of best values in tabulation above	F+	F+	F-	G
(2) Average of worst values in tabulation above	F-	P+	P+	F+

P = Poor F = Fair G = Good

Your grease will enjoy greater repeat sales...



when you use EMERY ANIMAL FATTY ACID

Consistent performance plus consistent high quality will keep your customers coming back for more! With Emery 531 Animal Fatty Acid, you can assure your customers of consistent quality and top-performance everytime. This will pay off in repeat sales and in customers who will spread the word of your reliable, fine greases...the kind of acceptance that is vital for the maintenance of good profits and continuity in business.

How does Emery 531 Animal Fatty Acid provide this? . . . By giving you these five advantages:

1. **High Grease Yield for Efficient Production**
2. **Outstanding Oxidation Stability**
3. **Highest Overall Quality**
4. **Uniform Performance**
5. **Technical Service**

Why not reap the benefits of all these advantages by ordering all your tallow fatty acid requirements from Emery.

Emery

Fatty Acids & Derivatives
Plastolein Plasticizers
Twitchell Oils, Emulsifiers

Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio

New York • Philadelphia • Lowell, Mass. • Chicago • San Francisco
Cleveland • Ecclestone Chemical Co., Detroit

Warehouse stocks also in St. Louis, Buffalo, Baltimore and Los Angeles

Export: Carew Tower, Cincinnati 2, Ohio

FARM LUBRICATION - 2

Let's Modernize Lubrication of Modern Farm Machinery

By WENDELL BOWERS, *University of Illinois, Urbana, Illinois*

TRACTOR vintage 1910, *courtesy Caterpillar Tractor company.*

Much can be done to relieve the burden of lubricating present day farm machinery. The past 15 or 20 years has brought about many new and revolutionary ideas with respect to capacity and fundamental design of farm machinery, but not much has been done to reduce the time and effort needed for lubrication. Now, more than ever, the farm operator must make every move count. It is not unusual to find a single operator farming 320 acres with only a few months of seasonal labor. On Northern Illinois grain farms in 1954 ranging in size from 260-339 acres the amount of labor hired in addition to the operator was only 5.8 months.

In talking to a number of farmers I am often told that too much time is spent in greasing their equipment. To get an idea of what they have in mind, look at a typical combine or corn picker lubrication service chart. One of the combines in operation today has 8 fittings to grease every 2½ hours, 56 every 5 hours, 18 every 10 hours and 8 every 30 hours. And a corn picker has 123 fittings to be greased twice daily. This all adds up to the fact that a person might easily spend 20 per cent of his time just carting a big grease gun all over a field, wiping off the fittings, trying to reach an inaccessible fitting, hunting new ones, greasing some twice and finally taking a handful of straw and wiping off his hands. To follow the service charts to the letter would undoubtedly insure against a bearing failure, but I ask you, is it necessary? I seriously doubt if lubrication recommendations for the various bearings you would find on a machine, is based on factual research. I can say without reservation that very few farmers ever grease a machine as often as called for in the owner's manual. However, most farmers take the precautions to try to catch a bearing that is headed for trouble. In my opinion, a lubrication chart which takes the operator over a machine at least once a day has more value from an inspection standpoint than for lubrication.

Some mention should be made of the tremendous waste that occurs with farm greases. I asked dozens of operators about the percentage of grease wasted in servicing the ordinary zerk fittings. Figures ranged from 20 to 90 per cent with an average around 50 per cent. While grease is not a very expensive item in the farmer's budget, most of them felt that waste was unnecessary. Primarily the waste comes from the excessive grease that goes through a bearing and that which runs out of pressure gun base after it is removed.

As a summary I would like to make the following recommendations:

First, I would suggest more extensive use of lifetime sealed bearings, even in cases where the price of a machine will be affected. I believe this is much better than having farmers service sealed bearings, because of the danger of breaking the dirt seal or getting foreign material into the bearing. Development in special lubricants may need to be made along these lines. Heat resistance and proper viscosity are important factors.

Secondly, I would like to see lubrication of slow moving or light load bearings put on a practical basis. For instance, how long will a ball or roller bearing last if serviced properly and allowed to run under dusty conditions? I have seen examples of well packed front wheel bearings on tractors that provided very good service for 4 to 5 years. Think what goes through a farmer's mind who is told to repack his front wheel bearings once a year and when making his usual 2 or 3 year inspection finds them in perfect condition.

Third, more needs to be done to have lubrication of adjacent or inconvenient bearings placed in a convenient location in a block system. This would save much time and probably do just as good a job.

Fourth, a more accurate means of metering grease to fillings is needed. The 50 per cent waste I mentioned is needless.

Last but not least, farmers need to be better educated on what types of grease to buy and how to service their equipment. It seems to me the grease and machinery companies should follow through on lubrication requirements of different bearing surfaces.

Trucking companies use lubricants containing Moly-Sulfide additives in as many as 12 points, because

Moly-Sulfide Extends Effective Lubrication

when hydrodynamic film is mechanically wiped away

One major trucking company now uses chassis grease containing Moly-Sulfide additive on all points of chassis lubrication. Bushings which formerly had to be replaced after 35,000 miles now last over 160,000 miles.

Another trucking company uses Moly-Sulfide additives in grease for fifth wheel lubrication. The squeezing and wiping action between the striker plate and the fifth wheel helps to orient the Moly-Sulfide film. After the grease is wiped off or squeezed out this film sustains lubrication until the fifth wheel is regreased. **Why?**

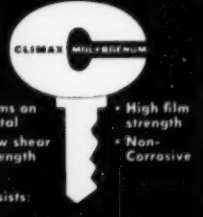
Because when Moly-Sulfide is added to lubricants it coats bearing surfaces with a protective film. If mechanical shock, water or shearing action displaces the hydrodynamic film, the Moly-Sulfide film sustains lubrication until the petroleum film is restored.

Greases with Moly-Sulfide additive are performing effectively by improving and extending lubrication in such vital parts as truck king pins, shackle bolts, spring eyes, fifth wheels, striker plates and torsion suspension bushings. In the railroad, aircraft, steel and oil drilling industries, Moly-Sulfide additive in greases is also performing in demanding applications.

Commercial quantities of experimental chassis grease are available from certain major oil companies. Climax Molybdenum Company is sponsoring fleet tests to study chassis greases containing Moly-Sulfide. Results will be made available at the conclusion of these tests.

You can use the coupon below to get bulletins, specifications, and sample of Moly-Sulfide.

Use the moly key ...to lubrication insurance



- Films on metal
- Low shear strength
- Resists:
  - heat
  - cold
- High film strength
- Non-Corrosive
- water
- chemicals

Department 58

CLIMAX MOLYBDENUM COMPANY

500 Fifth Avenue, New York 36, N. Y.

Please send me the following:

Literature

- ☐ "Moly-Sulfide, Lubricant Additive"
- ☐ "Moly-Sulfide in Chassis Grease"
- ☐ "Moly-Sulfide Specification and Properties"

Lists of Sources for

- ☐ Railroad Greases
- ☐ Chassis Greases

Sample — One-ounce tube of Moly-Sulfide ☐

Name_____ Position_____

Company_____

Address_____

FARM LUBRICATION - 3

Lubrication Equipment for MODERN Farm Machinery

By Owen L. Bandy
Lincoln Engineering Company
St. Louis, Missouri

The majority of us who are city dwellers get a somewhat distorted view of life on the farm, limited to an occasional trip through the countryside. While it is true that the modern farm has many of the conveniences of the city, one thing that confronts the farmer as a matter of considerable importance is lubrication.

The high standard of living that typifies today's farm has been brought about mainly by the efficient use of land resources through the use of modern farm machinery. The advent of the highly mechanized age on the farm has not been without its problems. Among the foremost of these problems is one of lubrication. The farmer has learned, sometimes from bitter experience, that these machines must have proper lubrication to prevent costly breakdowns. Within the memory of most of us, farm lubrication has progressed from the grease paddle and oil-can stage up through the grease cup and pin type hydraulic fitting to the present hydraulic fitting and its accompanying snap on, snap off coupler. The need for these developments was obvious as machinery became more complex with more points of lubrication and bearings requiring higher pressure.

To evaluate properly the lubrication needs of the present day farmer, we must first examine the operation of the modern farm including the personnel that operate it. The modern farmer is a far cry from the hick type depicted by the cartoonist. In education, culture and living standards he ranks with his city cousin. His home outbuildings are modern and attractive. His operation is on a sound business basis. He is his own employer, his own bookkeeper, his own laborer, his own maintenance man. During his work day he faces many of the same problems as management in industry. It must be said that he probably faces them a little more intimately than does other management. Among these, the problem of lubrication of his many and varied types of equipment is, certainly, not the least.

Many of today's farm implements are very complicated, both in use and maintenance. To gain proper returns on the cash investment in the machinery, he must not only operate it properly but must maintain it adequately. The farmer has been proved to be lubrication conscious, but conscious as he might be, the very nature of his problem makes it a knotty one. Much of his lubrication is done out in the field away from normal power sources. His daily timetable is at the whim of many things over which he has little or no control. Often he has to lay on his back in the dirt or mud to get at fittings in

awkward places. Most lubrication must start with cleaning dirt and debris, ever present in farm operations, from the fittings. At times this debris is such that it requires a search just to find the fitting. Add freezing temperatures to the above combination and you have a situation that is frustrating to say the least and an expensive time consumer any time.

Many types of lubrication equipment are available to the farmer, ranging from the lever grease gun, its companion the filler pump, bucket pumps and combinations of variations of these basic manual systems, up through the electrical and compressed air operated pumps. I will not try to describe all the individual types, but will discuss them only as manual and power systems.

Many Difficulties

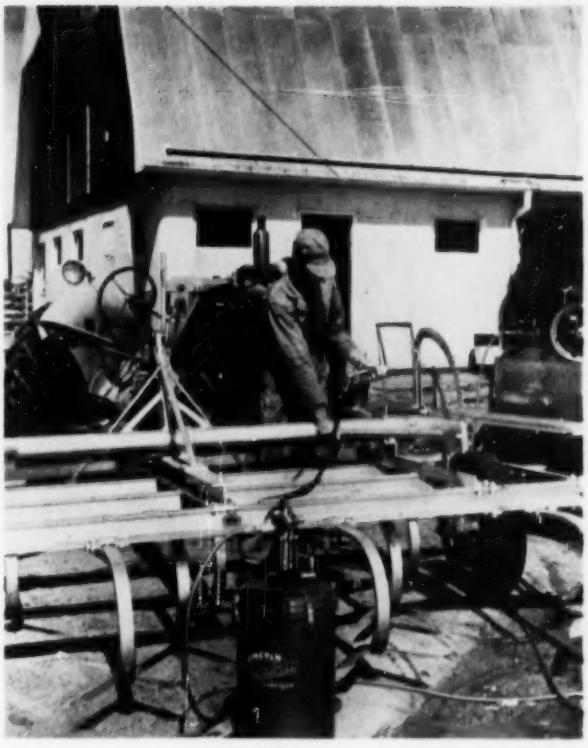
Perhaps the farmer has a scope of operation that will justify a modern power lubrication system; if so, he then must make this system portable so that it can be taken to the machinery in the field in place of bringing the machinery to it. This adds to the cost of the setup, and when you realize that he must, in all probability, add a power source, it adds still further to the cost. Even should the farmer make this investment, his lubrication problems are far from solved. He still has to contact each and every fitting with the attendant difficulties. The biggest advantage that power lubrication will give him is in the cases of bearings needing a large quantity of lubricant. It is obvious that in these cases power lubrication excels.

We must remember that the farmer is a business man and as such looks on lubrication the same as management in industry. It is an overhead expense which must be kept to the minimum. For that reason he looks kindly on the less expensive, manually operated lubrication devices. Much of this equipment is designed around a twenty-five or thirty-five pound lubricant container eliminating transferring of lubricants and the resultant contamination. Most of these are readily portable and present no problem in getting them to the field. To date many attempts have been made to improve on it. Still, in most cases, the lever gun with a filler pump is one of the most satisfactory tools for lubrication of farm machinery.

Eliminate "Down Time"

High speed farm equipment requires periodic lubrication. Take the combine: this machine may lay idle for a major part of the year, but, when it is used, the possibility of adverse weather conditions, plus the shattering of grain due to over-ripeness, make speed in harvesting essential. Daylight-to-dark operations of farm machinery is common, and these machines must be lubricated during this period, sometimes once, sometimes more than once. This down time, when the machinery is needed most, is what we must strive to shorten or eliminate.

Actually three people besides the farmer enter the picture of lubrication of farm machinery: the farm equipment manufacturer, those of us who manufacture lubricating equipment, and the refiner of lubricants. The equipment manufacturer must endeavor to design for lubrication points having maximum accessibility. The lubricant equipment manufacturer must endeavor to design better equipment for fast, efficient lubrication. The refiner must endeavor to compound lubricants suited to the



NO MATTER whether he does his lubricating in the farmyard (above) or in the field (below), today's farmer must have the best in greases and dispensing equipment for protection and maintenance of his highly developed machinery. *Photographs courtesy of Lincoln Engineering company.*

This field operation may someday be replaced by centralized lubrication, saving up to one fourth the farmer's time.

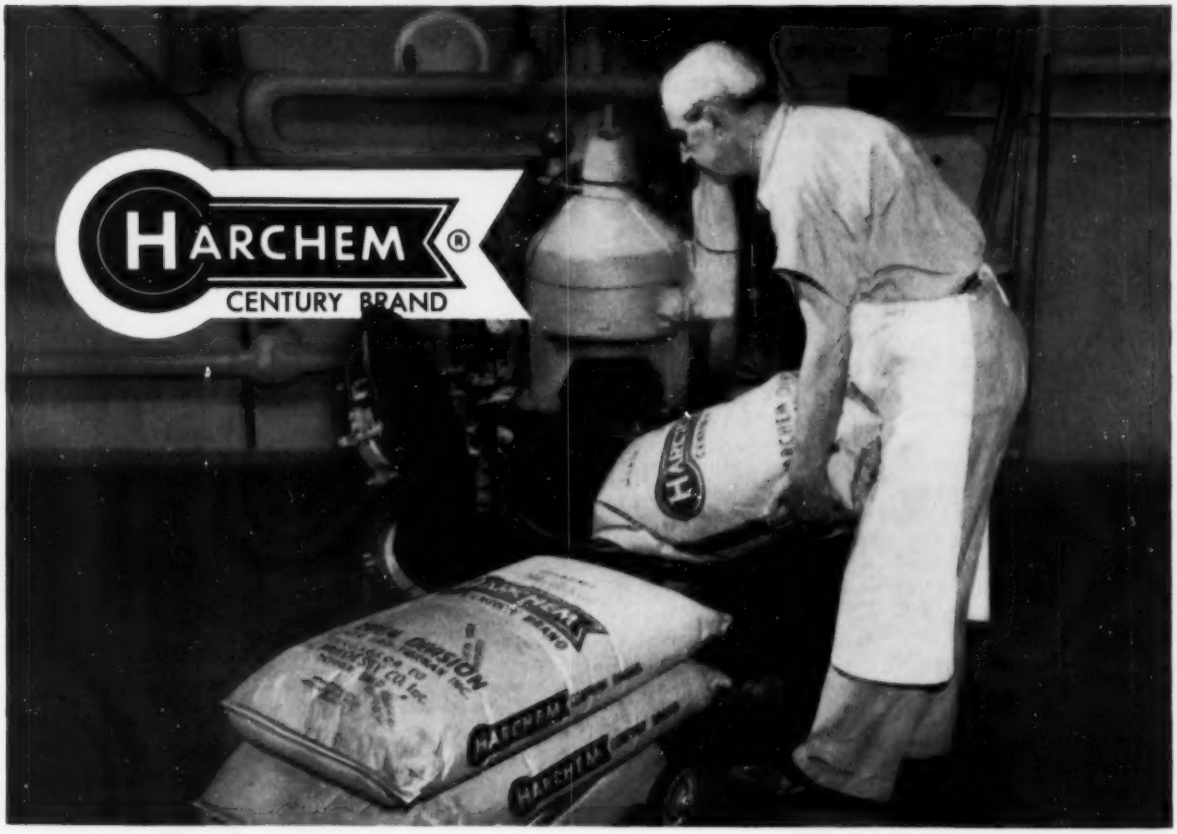
varied loads and conditions of operation such as climate, etc., that farm machinery is exposed to.

Taking a look into the future, we predict the possibility of Centralized Lubrication—simple, inexpensive and automatic—as being the ideal system for lubricating farm machinery. Equipping farm equipment with an automatic lubricator will increase its value to the farmer by prolonging its useful life far beyond the initial cost of the system. With a centralized system, down time during the working period is either eliminated or drastically shortened. It would be possible in many cases to work dawn to dark, or even 24 hours a day, stopping only to replenish fuel and change operators and still assure adequate lubrication of the equipment.

Why is Centralized Lubrication so ideal for farm machinery? In the first place, a tractor or combine has a large number of lubrication points and it takes time to get around to all of them. A Centralized System lubricates all these points simultaneously. Secondly, the Centralized System carries its own lubricant supply, so it's not necessary to haul the machine to the grease bucket, or vice versa. The machine can be lubricated right on the spot, wherever it happens to be at the time it needs lubricating. Third—and this is very important: just the right amount of lubricant, measured more carefully than a human operator is likely to take the time or trouble to do, is applied to the bearing each time the Centralized System is operated. And last, but certainly not least of all, the Centralized System allows tremendous flexibility of type of lubricant used. If grease is the required lubricant, the Centralized System can handle it; if oil is needed, the Centralized System can be operated often enough to supply an adequate amount of oil to accommodate the needs of the bearing.

It is recognized that Centralized Lubrication has a long road yet to travel. For one thing, some bearings on farm machines are so positioned as to make automatic lubrication very difficult; a universal joint, for example. Even where bearings can be readily contacted, the installation of the Centralized System becomes, on most machines, practically a tailor-made job involving the services of a qualified technician.

At present the lubrication equipment manufacturers, the farm equipment manufacturers and the refiners are traveling parallel roads, the ultimate goal being perfect lubrication of modern farm machinery. It is self-evident that should we combine forces to "roll the same wagon" down the road, we will reach our common goal much quicker.



KEY TO BETTER PRODUCTS...

...*CENTURY BRAND Fatty Acids*

You, as a user of fatty acids, can now insist on a uniform product, particularly adapted to your needs. The makers of Harchem CENTURY BRAND Fatty Acids recognize the need for products which are uniform and produce Harchem fatty acids by modern methods that assure continuing deliveries of products that are standardized as to purity and quality.

CENTURY BRAND, one of the oldest names in fatty acids, provides the key to uniform quality in your products. By reputation the makers of Harchem CENTURY BRAND Fatty Acids have a genuine interest in the needs and wants of their customers. Try Harchem Fatty Acids in your process. Tell us of your problem and ask for a free sample.

HARCHEM ®
CENTURY BRAND

HARCHEM DIVISION
WALLACE & TIERNAN, INC.
(SUCCESSOR TO: W. C. HARDESTY CO., INC.)
25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

H-8

FARM LUBRICATION - 4

FARMER

in Agricultural

By DALE O. HULL
Iowa State College
Ames, Iowa

Farming is a "dirty" business and by the same token, the farmer considers greasing and lubrication a "messy" job. With our Corn Belt farmers growing a bushel of corn with less than 2 minutes of labor, farmers in general would prefer almost complete elimination of grease lubrication with pressure guns as it is now used on the farm. In modern power farming, 18 per cent of the operator's time is lost in adjusting, transporting and servicing the tractor and implements connected to it. So from a farmer's standpoint, the stone boat is a very practical implement. It has one moving part. It has no lubricated points. It requires no adjustment.

Lubrication of agricultural machinery is complicated by more extreme variations in operating conditions affecting a single unit than are found in most industrial installations. Many farm implements in use in the United States experience wide temperature variations. Extreme temperature variations where agricultural machines are operated range from −30°F. where chore operations in livestock feeding require daily use of equipment in northern states to as high as 110°F. under irrigated desert crop production in our southwest. Moisture conditions can adversely affect lubrication inasmuch as some equipment might be operated in the rain, on one hand, to points where conditions of very low relative humidity exist. Dust, dirt and grit, either loose on the ground or in the air as dust, are an eternal problem in farm operations. It may range from extremely dusty conditions of the air to deep mud on the ground.

Another extremely important factor affecting machine lubrication and grease preferences is the fact that many implements such as harvesting machines must be operated either in a tall plant growth or under extremely damp conditions. The wiping effect of plant materials, both wet and dry, passing through, or over, or around moving machine parts complicates agricultural lubrication problems.

During the past three years increased competition in the farm equipment industry has resulted in the introduction of many completely new and redesigned implements.

While attending the Iowa State Fair, I took the opportunity of examining several of our more typical new designs in farm equipment in view of on-the-job lubrication requirements. To say the least, future requirements on our most modern implements are for only limited daily lubrication. For this reason, it is reasonable not to expect grease farm requirements to increase greatly, but for quality and suitability of the product to improve.

The Ferguson baler manufactured by Massey-Harris-Ferguson, Inc., is rather typical of new design work in agriculture. Seventy-five per cent of the bearings on this baler have either sealed factory lubricated bearings or bearings which require lubrication only two or three times each season. The Massey-Harris No. 80 self-propelled combine manufactured by this same organization has 63 sealed bearings which are permanently lubricated and only 30 bearings requiring pressure gun grease.

Multi-purpose Equipment Trend

In farm equipment there is a very definite trend to design implements to do more than one job. The John Deere "45" combine will field-shell corn and harvest all small grain, grass and legume seeds. Seventy per cent of the lubricated bearings are of the sealed factory lubricated type. All shaker and vibrator mounts are rubber.

One small combine manufactured by Cockshutt is equipped with 27 sealed bearings against 19 lubricated by conventional pressure gun methods. This implement is manufactured in Canada.

During the past five years we have seen the extensive design activity carried on by the Ford Motor Company in the farm implement field. This year they introduced a new 2-row mounted corn picker. This machine has 14 sealed bearings against 60 grease fittings. Several years ago the same machine would have required between 150 and 250 fittings requiring greasing from two to four times each day. Large use of enclosed bearings which are lubricated with transmission fluids results in a large reduc-

PREFERENCES

Lubricating Greases

tion in points lubricated. In the hay tool field, the Ford organization is marketing a new roll-bar-rake which has 20 bearings; 16 sealed bearings and 4 grease-lubricated bearings. The grease-lubricated bearings are located: 2 on the power take-off and 2 each on the caster shank of the support wheels. This latter example represents a maximum use of sealed bearings.

Lubrication of disk harrow bearings has long been troublesome on the farm. The Allis-Chalmers Manufacturing Company now manufactures a disk harrow with sealed axle bearings. They report testing these bearings in 5,000 hours of continuous operation before a bearing failure resulted. Special seals are needed, but 5,000 hours of service represents between 20 and 40 years of service with the average Corn Belt farmer.

From the foregoing examples of modern farm implement design, it becomes apparent that farmer grease preferences will become narrower with the reduction of total grease requirements for a year's use.

The farmer's grease preferences have been greatly influenced by the grease manufacturers themselves. The farmer's only contact with the manufacturers of lubricating greases is through the manufacturer's sales organization. His ideas have been influenced by sales promotion programs and demonstrational techniques.

In general, the farmer has come to prefer the stringy, viscous type of lubricating grease which tends to form a fine thread when pulled away from the grease fitting. He has found that in field operations this type of grease tends to form a wrap or seal around the end of bearings where a shaft is exposed. He would probably purchase the stringy, viscous lubricant in preference to a lubricant with a softer, buttery consistency. We have many farmers who prefer greases containing such materials as graphite. They can't explain why they prefer this material in the grease except that they might recall their experiences with dry lubricants which were once used in the old axle greases. In areas where graphite-loaded greases are sold, implement dealers consistently discount trade-in equipment in excess of normal book values because of the high rate of precision bearing replacement required on trade-ins.

There are at least four factors which distinctly affect the use of lubricating grease in agriculture.

Many farmers have a real interest in good maintenance and lubrication. Many others do not. These latter operators are inclined to regard their machinery and equipment as tools. They think of farm equipment as tools of the shovel and pitchfork type which never need to be sharpened. Because of a greater interest in growing crops and livestock, they have small interest in machine care. Too many of them prefer to replace farm equipment worn out by neglected lubrication, regarding them as obsolete rather than to extend their life by good maintenance.

Main Problem: Inaccessibility

Inaccessibility of lubrication points tends to discourage good implement maintenance. Many farm implements need lubrication several times a day. On such harvesting machines as corn pickers and combines, or with such implements as manure spreaders, many bearings require lubrication from two to four times a day to maintain peak efficiency. With harvesting machines in particular, and weather so often a factor, lubrication will be neglected in the rush of getting the crop harvested. On many of these harvesting machines, fittings on the underside of the implement are difficult to reach. It is not a particularly pleasant job to crawl under a corn picker in a patch of sandburrs or thistles. Many of these lubricated points operate at the higher speeds and it is to the credit of our implement engineers that many of the sealed bearings are now being used there. Older machines, however, must still be lubricated and will still suffer from a lack of grease.

Many manufacturers do not market their grease products in a desirable container from the farmer's standpoint. Filling hand guns from an open container results in contamination and waste. Some standardized type of connection for filling grease guns, particularly for the hand guns, would be most desirable from a farmer's standpoint. With many of the sticky, viscous type lubricants, the farmer gets more grease on himself than he does in the

gun. Farmers have rather readily accepted canned motor oil. Possibly a metal container to work with the grease dispenser which could be discarded might be desirable. However, I recognize that from a marketing and storage standpoint, there might be some objections to this type of handling.

The manufacturers of lubricating equipment have their problems, too. But from a farmer's standpoint, too many of our good grease guns are not fitted with adapters for lubricating difficult spots on the machine. Too many of the manufacturers have settled for fittings and adapters which will reach only *most* grease fittings on the implement. The implement designer can't make all fittings easy to reach, so there has to be some give-and-take between grease equipment design and implement design. We are seeing introduced in the agricultural field a limited number of one-shot all-point lubricating systems. At the present time, use of this system has been confined mainly to the corn picker which is our largest consumer of lubricating greases in the Corn Belt. It remains to be seen whether implement designers will favor the permanently lubricated sealed type bearings over a one-shot lubricating system.

From a farmer's standpoint, then, the grease lubricant requirements should be relatively simple.

It is my experience that the average farmer would settle for a good, all-weather grade of pressure gun grease suitable for use in either plain or anti-friction bearings. This grease should be easy to load into the grease gun and should dispense well. It should be affected very little by daily ambient temperature extremes. Probably 95 per cent of our grease lubricants are used here in the Corn Belt where air temperatures vary between 90°F. and 20°F. Earlier harvesting of corn using crop driers will reduce our demand for winter grades of grease lubricants. Farmers prefer to have their grease in a container from which it can be readily drawn into the grease gun without removing a tight cover to protect it from contamination. There is not a distinct color preference among farmers in my experience. Many of the older farmers seem to prefer dark colored greases. This stems from their experience as a boy with the dark axle greases of the horse-and-buggy era. The younger farmers, in general, seem to prefer lighter colored greases, mainly greenish in cast.

Rust preventive materials represent a relatively small amount of the farm grease requirement. Most farmers still prefer to have a gun type of grease which has enough water resistance to protect the shiny parts on their tillage equipment. Where rust preventives themselves are used, a dark colored product seems to be preferred because of the former wide use of axle grease as a rust preventive. Rust preventives should be unpalatable to livestock and at the same time should be nontoxic if possible.

MALMSTROM
NIMCO
BRAND
WOOL FAT & LANOLIN

Lubricating grease manufacturers know that top value and peak performance go hand-in-hand. That's why Malmstrom's NIMCO brands are specified. N. I. Malmstrom – largest processors of wool fat and lanolin products – produce quality components for grease production.

N. I. MALMSTROM & CO.

America's Largest Processor of Wool Fat and Lanolin

147 Lombardy St., Brooklyn 22, N. Y.
612 N. Michigan Ave., Chicago 11, Ill.

COMMON DEGRAS
NEUTRAL WOOL GREASE

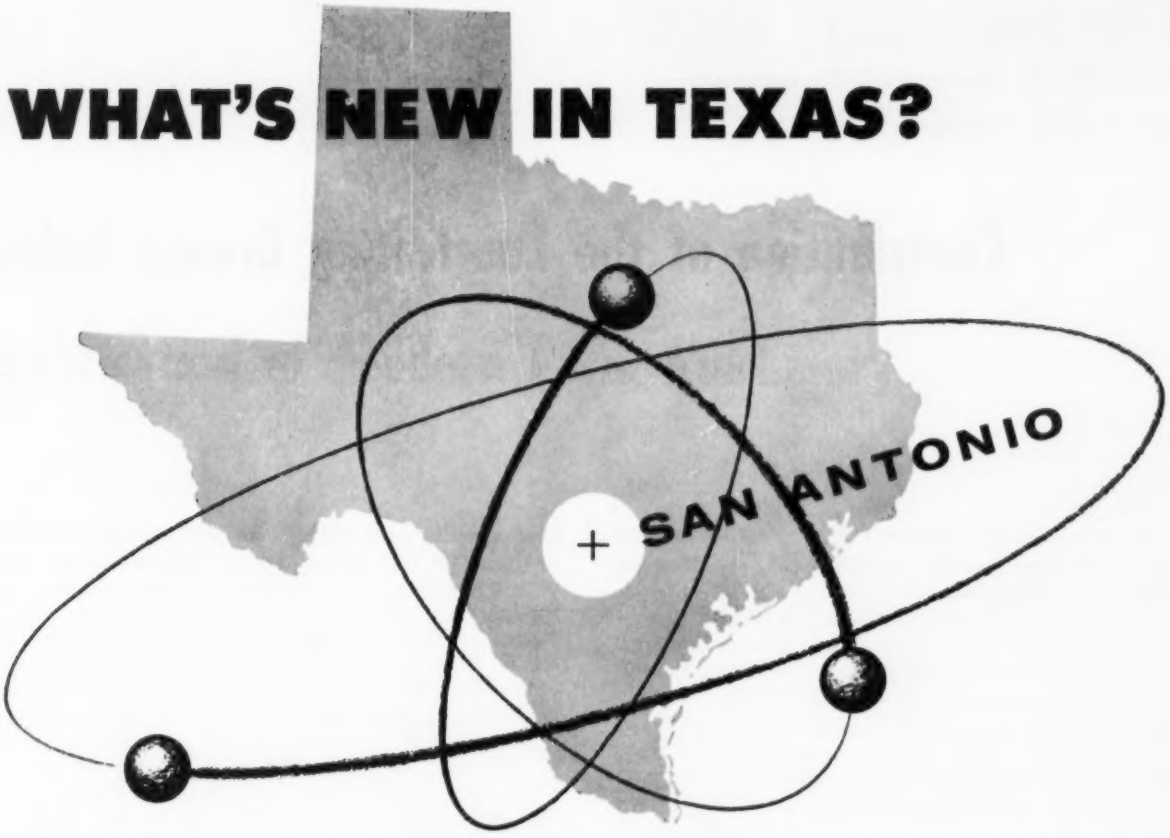
A small percentage of NIMCO Wool Grease Fatty Acids—naturally saturated fatty acids (free from rancidity)—gives your grease top stability, better performance. Write today for working sample.

WOOL GREASE FATTY ACIDS

Moisture	2% max.
Unsaponifiable (Wool Grease Alcohols)	6% max.
Saponifiable	94%
Free Fatty Acid (as oleic)	55-60%
Actual Free Fatty Acid Content	90%
Saponification No.	120-130
Free Inorganic Acid	0.2% max.
Iodine Value	20-40
Apparent Solidification Point (titre)	Approx. 44° C.
Softening Point	45-48° C.
% Sulfur	No corrosive sulfur

A.O.C.S. Methods

WHAT'S NEW IN TEXAS?



NEW SOURCE OF

Lithium Hydroxide

The new $6,600,000 plant of American Lithium Chemicals, Inc. in San Antonio, an affiliate of American Potash & Chemical Corporation, long the leading producer of Lithium Carbonate, makes available to producers of lithium-based greases an abundant new source of supply of LITHIUM HYDROXIDE. The new plant will process high-grade lithium ores from extensive deposits in Southern Rhodesia, assuring you of vast reserves, coupled with the most modern domestic production facilities available anywhere. You can count on the advantages of Trona LITHIUM HYDROXIDE in your all-purpose greases—moisture resistance, chemical and mechanical stability and wide temperature range, just as you can depend on the consistent good quality of Trona's new source of this vital all-purpose, all weather grease additive.

Send for technical information sheet

FOR Producers of LITHIUM-BASED GREASES

FOR LITHIUM CHEMICALS—LOOK TO AMERICAN POTASH!

American Potash & Chemical Corporation

TRONA
INDUSTRIAL AND AGRICULTURAL CHEMICALS

Offices • 3030 West Sixth Street, Los Angeles 54, California
• 99 Park Avenue, New York 16, New York
• 214 Walton Building, Atlanta 3, Georgia

Plants • Trona and Los Angeles, California
• San Antonio, Texas (American Lithium Chemicals, Inc.)

LITHIUM CARBONATE • LITHIUM HYDROXIDE • LITHIUM BROMIDE • LITHIUM CHLORIDE and other LITHIUM CHEMICALS

By C. J. Boner
Battenfeld Grease and Oil Corporation
Kansas City, Missouri

Contribution of the Lubricating Grease Industry

Introduction

In considering this subject we might approach it by patting ourselves on the back, or in the case of those not so physically constituted that this is possible, by beating of breasts, and proclaim that we have done a wonderful job and cite the fact that the machinery still continues to operate.

It seems to me that a better approach would be that of humility and in such an attitude we should ask ourselves what is desirable or necessary in a lubricant for modern farm machinery and whether we have actually given the service we should.

With this in mind, I propose to emphasize the points which we have found are of major interest to the user of the lubricant. The following points were arrived at by actual polls of farmers or of people who visited farms in pursuit of their business. These subjects will be introduced in the order of importance as indicated by the survey. This then will necessarily make reference to characteristics of lubricating greases as an indication of whether we have performed our function as we should.

Ease of Application

Foremost in the desirable characteristics was ease of application of the lubricant. In this category was included not only ease of pumping from guns but also the dispensing methods, the means for refilling guns, and the time consumed in all of the operations.

Most marketers of lubricating greases have been aware that ease of pumpability is of primary importance when the equipment being serviced is subjected to cold weather, particularly such as in the northern or middle tier of states as well as in Canada. The problem has sometimes been solved by either lowering the viscosity of the oil in the lubricating grease or by supplying a softer product for winter months. While some consumers expect such lubricants to be dispensable at zero Fahrenheit, one can imagine that most lubrication is neglected at such low temperatures. The average lubricating grease supplied for use on farm equipment pumps fairly well at freezing temperatures and thus should be satisfactory.

Tied in with the above characteristics is the problem of slumpability, that is the ability of the lubricant to feed to the intake of a pump or gun. Slumpability decreases with a lowering of temperature and often the fact that the lubricant will not pick up as a gun is being filled is blamed on lack of ability to pump when actually it is due to the fact that the lubricating grease does not settle in the container. This trouble can be partly solved by the same steps as mentioned above, that is by providinng a softer grade of lubricant. Further, a change in texture to one with more fiber will often increase the slumpability. Also, the Petroleum Industry is trying to help solve this problem by recommending the proper dispensing equipment such as follower plates in lubricant containers.

The importance of ease of dispensing is evident from the statement of one farmer that it often took him fifteen minutes to refill a grease gun. Another said that he had to have six guns so that he would always have a gun filled and on a piece of equipment when needed. We can realize that when one farm operator with modern equipment handles the plowing, seeding, cultivation and harvesting of 160 or more acres of ground that his time is worth more than that of most city workers. This being the case, it is a must for our industry to provide lubricants and dispensing means which will save time for the farm operator. While we have done well, I believe that we can improve on our contribution in this direction.

Length of Service

Next in interest to the operator of farm equipment was the length of service of the lubricant. Here we encounter the same situation as has recently been brought to the fore in the case of automobiles. What constitutes a reasonable length of service of a lubricating job and how is this measured?

As far as we can learn, squeaking is the measure used by the farm operators and, in general, they think they should not have to relubricate more often than twice a day.

Of course, some men admit that they do not lubricate as often as they should. Further, the more often a lubricant is applied the better earth or dirt is purged from the bearings. Therefore, while it is advisable to provide lubricants with a long life, it is equally important to educate the user to lubricate frequently. Perhaps the ease of appli-

to Lubrication of Modern Farm Machinery

cation ties in with how often an operator will lubricate.

Cleanliness

This factor with regard to the use of our products is often overlooked and yet it was a point raised by both farmers and their wives. The wife would be much happier if clothing and hands were not soiled by lubricants.

There is perhaps a smaller proportion of dark colored lubricating greases sold than was true a number of years ago. In this respect, our industry is catering to the above desire. Perhaps the easier the lubricant is to apply, the less necessity there will be for soiling of hands.

In any event it seems that the lubricating grease industry can be instrumental in seeing that lubricants can be handled with as little waste and as much cleanliness as possible.

Protection from Contamination

While the manufacturer of lubricating grease has always preached the necessity of cleanliness of his product, to insure this we should deliver the lubricant in containers which will prevent contamination in the field. A visit to one barn disclosed three pails of lubricating grease, each about one-fourth full and each having considerable chaff and dust on the surface. This farm operator realized that lubricants in this condition were not fit to go into bearings.

Since this point was rated as fourth in importance by most people interviewed that indicates that these men know that less contamination means less waste of lubricants. Perhaps our industry can provide means so that lubricating greases will reach the bearings without the possibility of contamination.

Time Consumed in Greasing

Although this factor was rated fifth in importance, the farm operator's time is money and if we want to save him money we should devise the most efficient method of dispensing lubricating greases.

This ties in with the ease of application. By providing a more rapid way of filling guns we can help in this regard and also forestall the installation of expensive one-shot systems.

Reasonable Cost

While this is listed because a certain number of farm operators mentioned it, we hardly think it is worthy of discussion. First, competition will take care of this, and next this class of consumer is wise enough to realize that the cheapest product is not necessarily the most economical.

Multi-Purpose Lubricating Greases

Only one farm operator interviewed made mention of the fact that he would like to have a lower inventory of lubricating greases. The Multi-Purpose Lubricating Greases, which many distributors now offer, are certainly a step in this direction and our industry should take credit for this advancement.

With such a lubricant, not only does one product serve all points on every piece of equipment, but also there is not a chance for error in applying the wrong lubricant. Further, the proper product will always be present in the guns no matter how many spare guns a man may have.

Another advantage which a Multi-Purpose Lubricating Grease offers to the farm operator is that it provides a better seal against the entrance of dirt to bearings than did many farm lubricants of the past. This is because these newer products are stiffer than some lubricating greases previously used.

Likewise, there should be less drippage when Multi-Purpose Lubricants are used rather than softer grades. This then should be a step toward a more cleanly product.

Protection Against Elements

Most lubricating greases supplied to the farm trade are resistant to the action of water and therefore do not wash off if used under damp conditions.

Also, most of these products, if used properly, will keep the equipment from rusting. While our industry provides the proper material to prevent corrosion, it does not insure that the lubricant is always used when and where necessary. This statement is made because we found that many farm operators admitted that they were lax in proper lubrication. Often at the end of a season the equipment is stored or left out without a final lubrication. The necessity for greasing before laying up farm equipment should be stressed by our industry wherever and whenever possible. Better adherence to such a procedure would help both the farm operator and our industry.

Distributing Methods and Educational Programs

Mention should be made of the fact that distributors of Lubricating Greases to farm operators deserve a lot of credit for the manner in which they make satisfactory lubricants available, as needed, at any point in our nation. Further, many of these suppliers have educational programs for tankwagon drivers who in turn pass on information on proper lubricants and application to the farm operator. Such help can well be increased to the advantage of both the distributor and the user.

Summary

Past experience in American Industry indicates that once a problem is recognized it is eventually solved. This Symposium will have served its purpose if it points out that we still do have problems in providing the best possible lubricating service to farm operators.

A limited survey indicates that some of these problems are:

1. To provide lubricants and methods of dispensing which will make application of lubricating greases easier and more rapid for the farm operator.

2. To provide products which will have a longer service life.

3. To provide dispensing methods which will assure less soiling of the operator's hands and his garments.

4. To so package our products that there will be less possibility of contamination.

When and if we solve all of these problems and also educate the farm operator to thoroughly grease before laying up equipment, we can consider that we have made our proper contribution to the lubrication of modern farm equipment.

Farm Lubrication CONCLUSION

It is common knowledge that the standard of living and education of the farmer is much higher than a few years ago. They have become very practical and are ready to accept any new idea or practice. This is especially true with the latest developments in farm machinery, so that a greater number of acres may be cultivated with the greatest of ease and at a lower cost. With new types of machinery, having bearings with higher loads and speeds they have had to change their thinking in lines of lubrication. Multi-purpose greases have been introduced to them not only as a better lubricant, but also as a money and time saver. These lubricants have been put in more convenient packages, and better dispensing equipment is introduced each year to guarantee better lubrication of the high priced machinery. It is the responsibility of the machinery manufacturer, the lubricating grease manufacturer, and those who make dispensing equipment, to make a study of the farm problems of lubrication and do everything in their power to help solve them. We must better educate the farmer as to what a lubricant is and what it will do when properly used.

Next Month . . . Read **FARM LUBRICATION** *Question and Answer Session*
Actual Recordings from NLGI Annual Meeting Discussion

FOR THE MANUFACTURE OF GREASES THAT DELIVER

Top Performance...

USE

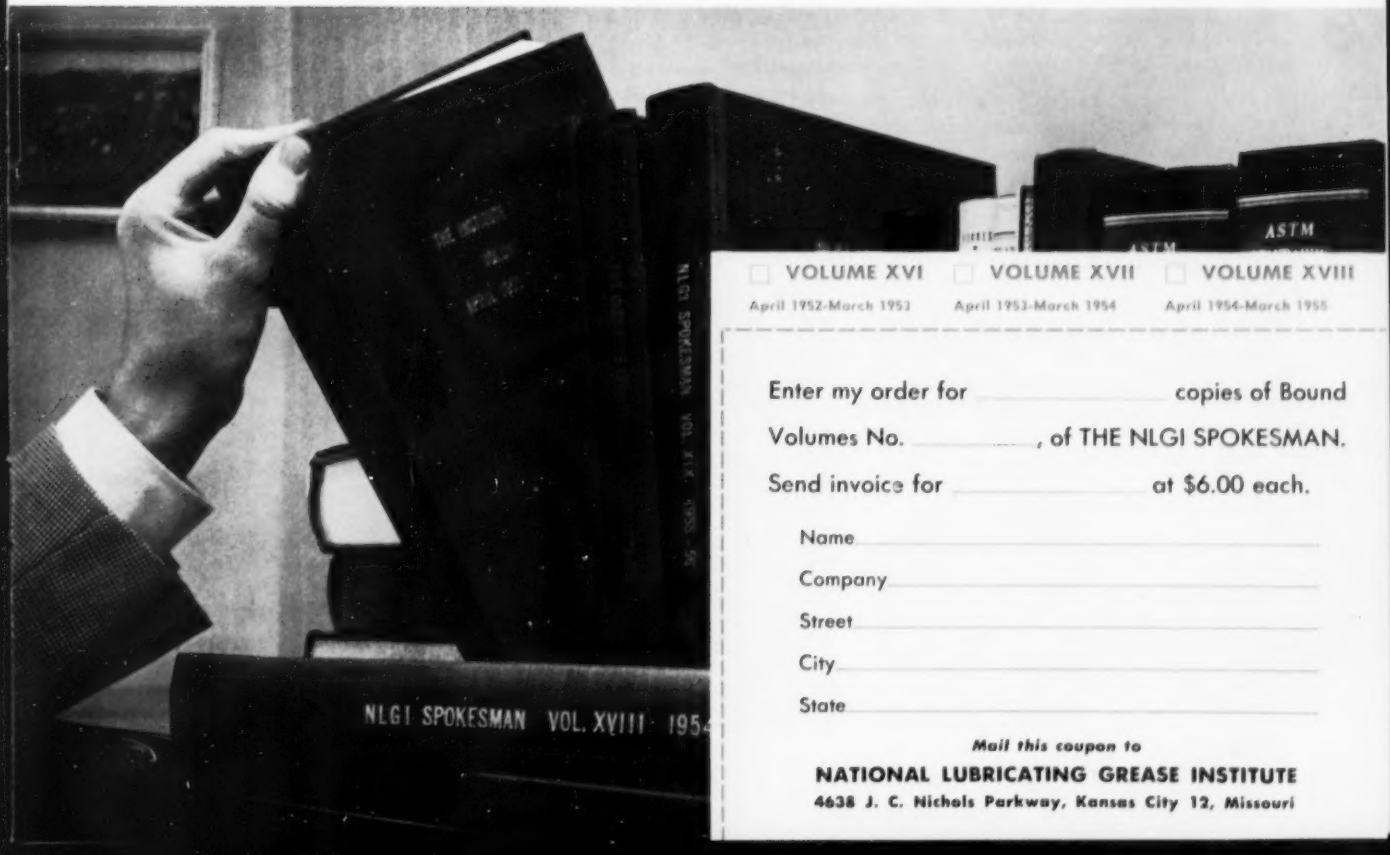
GULF QUALITY STOCK OILS

GULF

A COMPLETE line of stock oils, quickly available to you through strategically located warehouses, terminal facilities, and refineries in 31 states from Maine to New Mexico. Also quality petrolatums.

GULF OIL CORPORATION
GULF REFINING COMPANY
2927 GULF BUILDING
PITTSBURGH 30, PA.

Spokesman — *A few remaining bound volumes . . .* XVI, XVII, *and* XVIII



☐ VOLUME XVI (April 1952-March 1953) ☐ VOLUME XVII (April 1953-March 1954) ☐ VOLUME XVIII (April 1954-March 1955)

Enter my order for _____ copies of Bound Volumes No. _____, of THE NLGI SPOKESMAN.

Send invoice for _____ at $6.00 each.

Name _____

Company _____

Street _____

City _____

State _____

Mail this coupon to

NATIONAL LUBRICATING GREASE INSTITUTE
4638 J. C. Nichols Parkway, Kansas City 12, Missouri

Co-author E. L. Armstrong, right, inspects ball joint suspension.

common denominators

for automotive chassis greases

By T. G. Roehner and E. L. Armstrong
Socony Mobil Laboratories
Brooklyn, New York

Here are a few common requirements of chassis greases used at service stations with emphasis on the classification of greases in terms of performance.

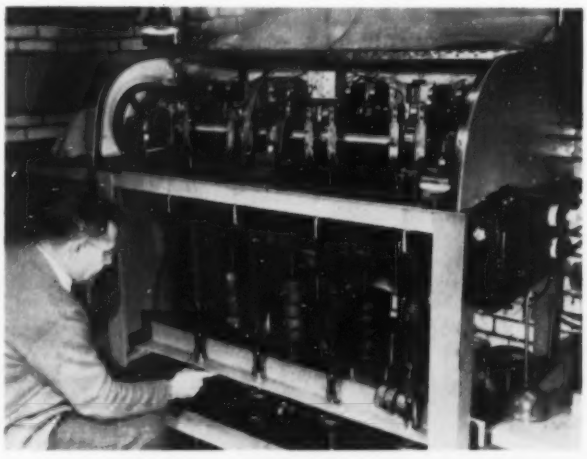
Lubricating greases currently used at service stations for lubrication of automotive chassis bearings vary from conventional calcium base greases, which are equivalent to so-called cup greases, to unique greases which represent the commercialization of results of long-range research projects. What are the common denominators for this wide range of greases all used for the same purpose?

Some of the common denominators employed within the automotive industry are quite superficial. Greases may be improperly classified in accordance with the metallic radicals of their components in such a way as to imply that all greases made with soaps having the same metallic radical such as sodium, calcium, or lithium, have common performance levels. Actually, greases of the same type by that classification may vary widely in dispensability and performance properties, even though they may also contain the same mineral oils. They may differ to an important extent in respect to those key properties because their soaps may have different structures which, in turn, are dependent on the organic radicals of the soaps and manufacturing techniques. Another questionable common denominator is consistency expressed in ASTM cone penetrations at 77°F. In fact, two greases may have identical consistencies at 77°F. and regardless of soap type they may behave as two quite different products at elevated or low operating temperatures.

Essentially, chassis greases must satisfy two requirements, i.e.:

1. Satisfactory dispensability in service station greasing equipment.

Figure 1. Chassis constant load grease tester.



2. Satisfactory performance in chassis bearings in cars on the road.

It is believed self-evident that dispensability is a common denominator of chassis greases as used at service stations. Improvements in their performance characteristics will not be readily commercialized unless the greases can be satisfactorily handled by existing service station dispensing equipment. It is estimated that there are well over 200,000 service stations in this country. It is reasonable to expect resistance from the dealers to a move which would junk 200,000 grease guns.

The National Lubricating Grease Institute has developed a tentative method of rating chassis greases and service station pumps in terms which are independent of composition and design respectively. The method is a means to find out whether a particular pump will dispense a given grease at a specified flow rate and temperature. The given grease is defined not in terms of its composition but in terms of its apparent viscosity versus temperature relationship. Plate I (page 28) was drawn by Mr. L. C. Brunstrum of the Standard Oil Company (Indiana). On referring thereto it will be noted that the lowest temperature at which a given pump will deliver a minimum of 2 ounces of a given grease per minute (Curve III) can readily be checked if the supplier of the grease provides the apparent viscosity versus shear rate curves (Curve I) for that product, and the pump manufacturer submits the flow rate versus apparent viscosity curves (Curve II) from which can be read the heaviest apparent viscosity that the given equipment can handle to meet the prescribed conditions.

After the dispensability requirement has been satisfied, the next basic consideration is the behavior of the grease in the chassis bearings. As already noted above, a single characteristic of greases, such as type of soap base and ASTM cone penetration, does not indicate their over-all performance rating as chassis lubricants. To bridge the gap between such tests and field tests, emphasis has been given to the development of so-called laboratory functional tests. A common denominator would be the performance of greases in a standardized laboratory functional type test which correlates with performance on the road. Such a tester would evaluate the abilities of the products to stay put, prevent bearing wear and also maintain ride qualities of the cars. Incidentally, a grease with good stay-put properties is not always a product with good antiwear characteristics. It may channel excessively and so permit contact between the bearing surfaces in the high-pressure areas. Continuous prevention of bearing wear may not automatically mean continuous high levels of ease of steering.

The photographs in figures 1, 2 and 3 show three types of functional testers used by the Socony Mobil Laboratories in the attempt to predict performance properties of greases under actual service conditions.

1. *Chassis Constant Load Grease Tester*

This test unit employs a steel pin and oscillating bushing and is a modified model of that designed by International Lubricants Company as reported by Hendricks and Smith in The Institute Spokesman in Janu-

Figure 3. *Right*—Vibrating front end suspension tester . . . another "functional tester used by the Socony Mobil Laboratories in the attempt to predict performance properties of greases under actual service.

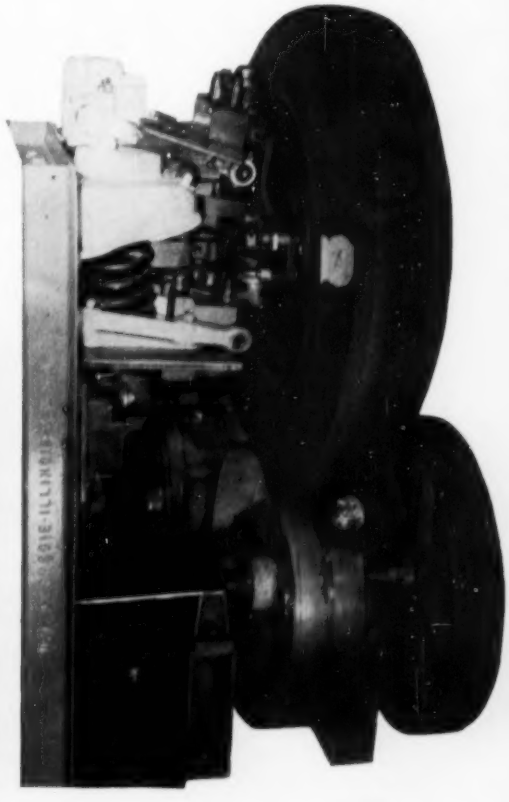
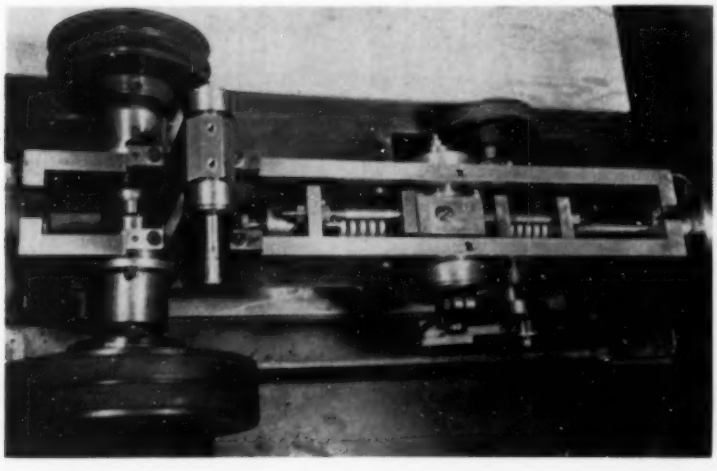


Figure 2. *Below*—Chassis cushioned shock load tester.



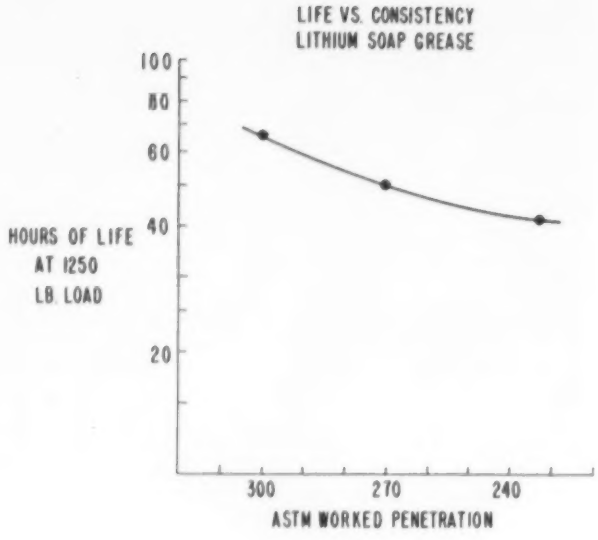


PLATE II

ary 1951. It has four test bearings employing loads up to 1,500 pounds per bearing.

2. *Chassis Cushioned Shock Load Tester*
This unit was designed to give a closer approximation to actual service conditions. This same type of bearing specimens are employed but the loading is arranged so that a constant 500 pound load is obtained with a calibrated spring and an additional 500 pound load is applied 50 times per minute as either a cushioned shock load or a direct hammer blow. This tester is more severe than the first one shown.

3. *Vibrating Front End Suspension Tester*
This test unit employs either a Ford ball joint or Chevrolet spherical joint front-wheel suspension. The tire rides on a cam with appropriate "bumps" to simulate a cobblestone road. The joints are stressed in all three directions. At the present time, this unit is operated for several million cycles, then torn apart for inspection. This unit can also be used as a "Vibrating Wheel Bearing Tester."

Plates II and III are two curves which illustrate the type of data obtained with the Chassis Constant Load Grease

BASIS OF NLGI TENTATIVE DISPENSING METHOD

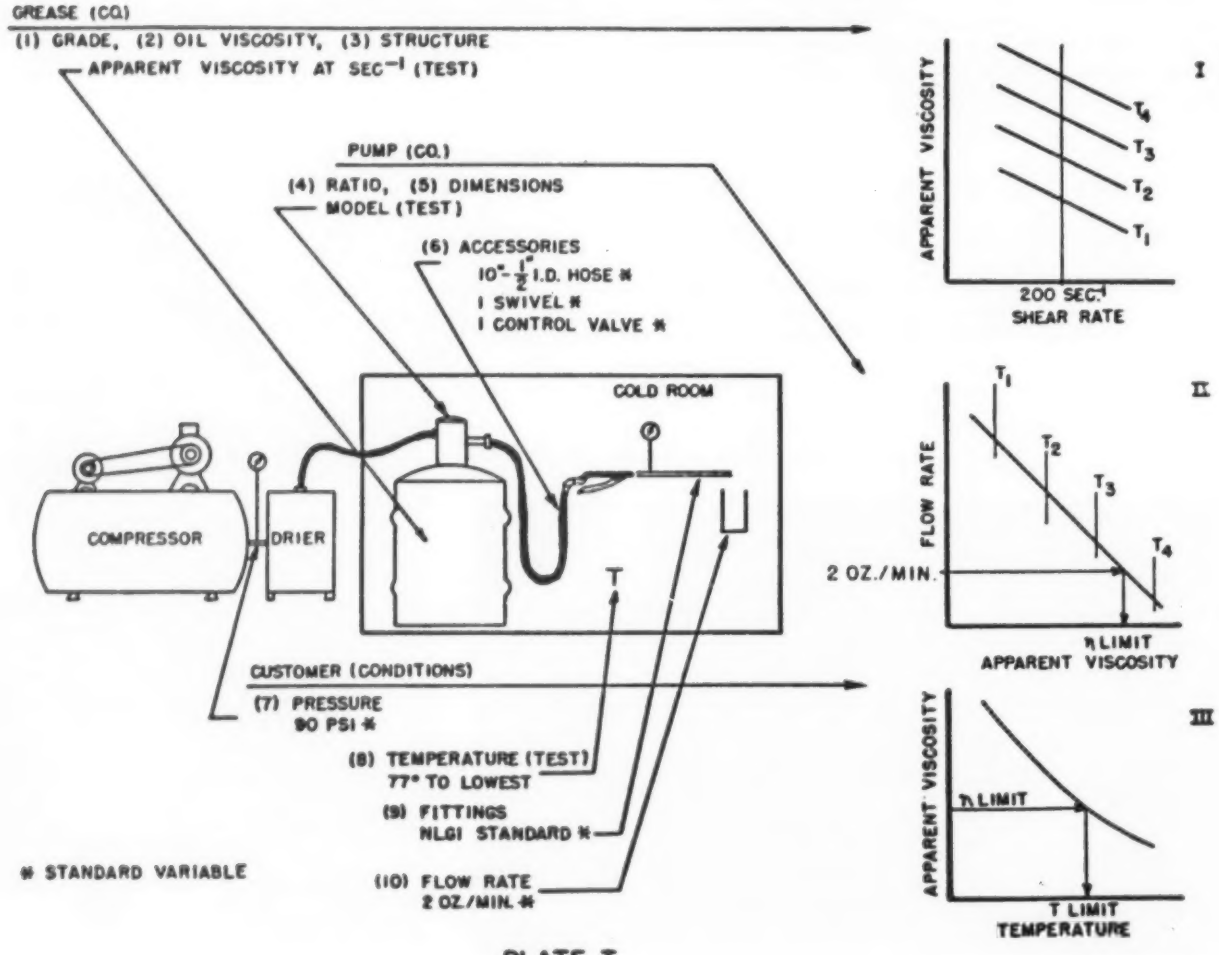


PLATE I

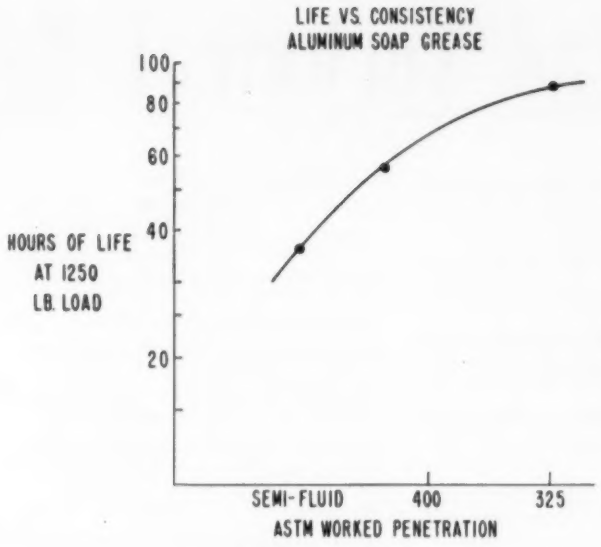
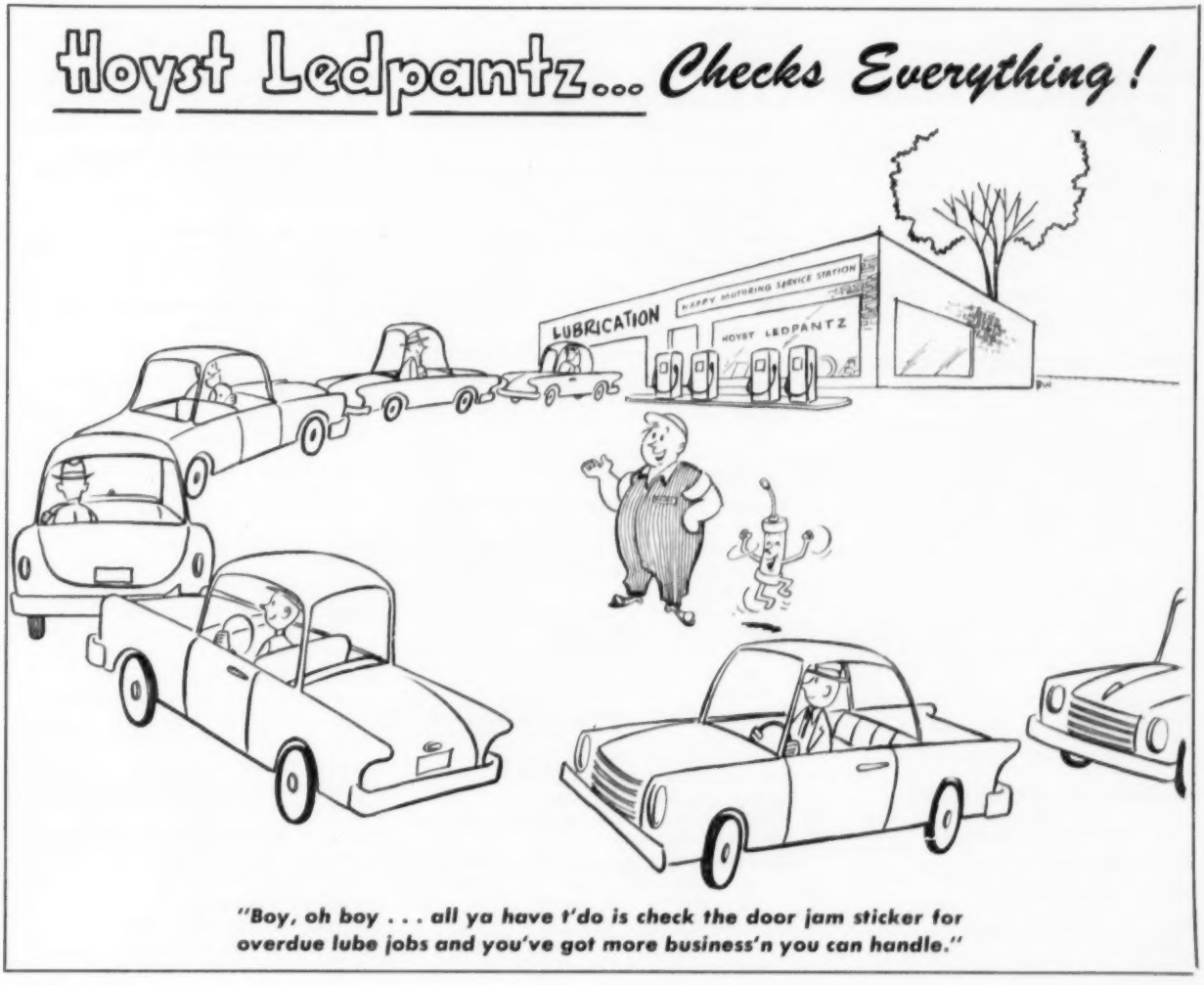


PLATE III

Tester. The curves show hours of life versus ASTM worked penetrations for a series each of aluminum and lithium soap greases. The cutoff point for the test runs was the temperature at which metal-to-metal contact occurred sufficiently to raise the bearing temperature from 100°F. to 135°F. It will be noted that the trends are reversed for the two curves in that the stiffer grease gave the longer bearing life for the series of aluminum soap greases, while the softer consistencies gave the longer protection for the series of lithium soap products. It is not to be implied that these trends would be expected for all aluminum and lithium base greases. One of the principal reasons for the decrease in bearing life with increase in consistency of the particular series of lithium base grease tested was its marked resistance to structural breakdown under shearing action. In the oscillating type plain bearing, the rate of renewal of lubricating film was reduced as the consistency of the grease was increased from the light to the heavy end of the series.

At the present stage of development of functional testers, it may be said that the results raise as many questions as answers and there is plenty of room for improvements in design and selection of operating conditions.


Hoyst Ledpantz... Checks Everything!
LUBRICATION
HAPPY MOTORING SERVICE STATION
HOYST LEDPANTZ
"Boy, oh boy . . . all ya have t'do is check the door jam sticker for overdue lube jobs and you've got more business'n you can handle."

NLGI Associate and Technical Mem

CONTAINER AND CLOSURE MANUFACTURERS

American Can Company
4810 Belleview, Kansas City 12, Mo.

Bennett Industries, Inc.
Peotone, Illinois
Representative—S. A. Bennett

Central Can Company
2415 West 19th St., Chicago 8, Illinois
Representative—Henry Frazin

Continental Can Company, Inc.
100 East 42nd St., New York 17, N. Y.
Representative—T. A. Graham

Geuder, Paeschke & Frey Company
324 North Fifteenth St., Milwaukee 1, Wis.
Representative—Neil Savee

Inland Steel Container Company
6532 South Menard Ave., Chicago 38, Ill.
Representative—Robert J. Greenebaum

Jones & Laughlin Steel Corporation
Container Division
405 Lexington Ave., New York 17, N.Y.
Representative—D. O. Merrill

National Steel Container Corp.
6700 South LeClaire Ave., Chicago 38, Ill.
Representative—Henry Rudy

The Ohio Corrugating Company
917 Roanoke Ave. S. E., Warren, Ohio
Representative—Lawrence F. McKay

Republic Steel Corporation
Container Division
465 Walnut Street, Niles, Ohio
Representative—Theodore Humphrey

Rheem Manufacturing Company
477 Madison Ave., New York 22, New York
Representative—F. J. Blume

Rieke Metal Products Corporation
Auburn, Indiana
Representative—Mahlon E. Rieke

United States Steel Products
Division, United States Steel Company
30 Rockefeller Plaza, New York 20, N.Y.
Representative—Wm. I. Hanrahan

Vulcan Containers, Inc.
P. O. Box 161, Bellwood, Illinois
Representative—H. B. Scharbach

ENGINEERING SERVICES

The C. W. Nofsinger Company
906 Grand Ave., Kansas City 6, Missouri
Representative—C. W. Nofsinger

MANUFACTURERS OF EQUIPMENT FOR APPLICATION OF LUBRICATING GREASES

Aro Equipment Corporation
Bryan, Ohio
Representative—R. W. Morrison

Balcrank, Inc.
Disney near Marburg, Cincinnati 9, Ohio
Representative—Richard P. Field

Gray Company, Inc.
60 Northeast 11th Ave., Minneapolis 13, Minn.
Representative—B. A. Beaver

Lincoln Engineering Company
5701 Natural Bridge Ave., St. Louis 20, Mo.
Representative—G. A. Hubbard

Stewart-Warner Corporation
Alemite Division
1826 Diversey Parkway, Chicago 14, Illinois
Representative—D. C. Peterson

United States Air Compressor Co.
5300 Harvard Ave., Cleveland 5, Ohio
Representative—C. A. Bening

MARKETING ORGANIZATIONS

Ampol Petroleum, Ltd.
Buchanan Street
Balmain, New South Wales, Australia

California Texas Oil Company, Ltd.
551 Fifth Ave., New York 17, New York
Representative—Hal U. Fisher

Canadian Petrofina Limited
1015 Beaver Hall Hill
Montreal, Quebec, Canada
Representative—M. E. Wight

Denco Petroleum Company
5115 Denison Avenue, Cleveland 2, Ohio
Representative—I. O. Carmichael

D-X Sunray Oil Company
Mid-Continent Bldg.,P.O. Box 391, Tulsa, Okla.
Representative—J. W. Basore

Farmers Union Central Exch., Inc.
P. O. Box G, St. Paul 1, Minnesota
Representative—H. F. Wagner

Ohio Farm Bureau Cooperative Association, Inc.
245 North High Street
Columbus 16, Ohio

Valvoline Oil Company
Division of Ashland Oil & Refining Co. Box G
Freedom, Pennsylvania
Representative—D. A. Smith

SUPPLIERS OF EQUIPMENT FOR MANUFACTURING LUBRICATING GREASES

Barrett Manufacturing Company
P. O. Box 8096, Houston 4, Texas
Representative—George J. Barrett, Jr.

Chemicolloid Laboratories, Inc.
30 Church St., New York 7, New York
Representative—David F. O'keefe

The Girdler Company
A Div. of National Cylinder Gas Co. Box 987
Louisville 1, Kentucky
Representative—J. E. Slaughter, Jr.

Manton-Gaulin Mfg. Co., Inc.
44 Garden Street
Everett 49, Massachusetts
Representative—G. W. Eldridge

Morehouse-Cowles, Inc.
707 Henry Grady Building, Atlanta 3, Georgia
Representative—George E. Missbach

Stratford Engineering Corporation
612 W. 47th Street, Kansas City 12, Missouri
Representative—D. H. Putney

Struthers-Wells Corp.
1003 Pennsylvania Ave. West, Warren, Pa.
Representative—R. J. Reed

SUPPLIERS OF MATERIALS FOR MANUFACTURING LUBRICATING GREASES

Acme-Hardesty Company
60 East 42nd St., New York 17, New York
Representative—W. C. Hardesty

American Cyanamid Company
30 Rockefeller Plaza
New York 20, New York
Representative—R. B. Wainright

American Potash & Chemical Corp.
99 Park Avenue
New York 16, N. Y.
Representative—W. F. O'Brien

Archer-Daniels-Midland Company
Chemical Products Division, 2191 W. 110th St.
Cleveland 2, Ohio
Representative—Frank C. Haas

Armour & Co., Chemical Division
1355 West 31st St., Chicago 9, Illinois
Representative—H. F. Whitler

The Baker Castor Oil Company
120 Broadway, New York 5, New York
Representative—H. H. Fritts

Climax Molybdenum Company
500 Fifth Ave., New York 36, New York
Representative—Elwin E. Smith

Darling & Company
4201 South Ashland Ave., Chicago 9, Illinois
Representative—G. W. Trainor

E. I. du Pont de Nemours & Co.
Wilmington, Delaware
Representative—John R. Sabina

The Elco Lubricant Corporation
Jennings Road & Denison Avenue
Cleveland 9, Ohio
Representative—Frank X. Sieloff

Emery Industries, Inc.
4300 Carew Tower, Cincinnati 8, Ohio
Representative—R. F. Brown

Enjay Company, Inc.
15 West 51st St., New York 19, New York
Representative—Sidney W. Fay

Foote Mineral Company
18 W. Chelten Ave., Philadelphia 44, Penn.
Representative—W. F. Luckenbach

General Mills, Inc.
Chemical Division, 400 Second Ave. South
Minneapolis 1, Minnesota
Representative—Abner C. Hopkins, Jr.

A. Gross and Company
295 Madison Avenue, New York 17, N. Y.
Representative—Eugene W. Adams

The C. P. Hall Company of Illinois
5145 West 67th St.
Chicago 38, Illinois

Harchem Division Wallace & Tiernan, Inc.
P. O. Drawer 110, Dover, Ohio
Representative—W. G. McLeod

nbers...

Supporting Your Organization These Suppliers to this Industry and Marketers of its Products Hold Membership in NLGI

Harshaw Chemical Company
1945 East 97th Street, Cleveland 6, Ohio
Representative—W. J. Straka

Lithium Corporation of America, Inc.
Rand Tower, Minneapolis 2, Minnesota
Representative—Walter M. Fenton

The Lubrizol Corporation
Box 3057—Euclid Station, Cleveland 17, Ohio
Representative—J. L. Palmer

Mallinckrodt Chemical Works
2nd & Mallinckrodt Sts., St. Louis 7, Missouri
Representative—D. B. Batchelor

N. I. Malmstrom & Company
147 Lombardy St., Brooklyn 22, New York
Representative—Ivar Wm. Malmstrom

The McGean Chemical Company
Midland Building, 101 Prospect Ave.
Cleveland 15, Ohio

Metasap Chemical Corporation
Harrison, New Jersey
Representative—O. E. Lohrke

Minerals & Chemicals Corporation of America
Menlo Park, N. J.
Representative—R. H. Hubbell, Jr.

Monsanto Chemical Company
1700 Second Street, St. Louis 4, Missouri
Representative—J. W. Newcombe

National Lead Company
Baroid Sales Div., 111 Broadway, N.Y. 5, N.Y.
Representative—H. H. Farnham

Newridge Chemical Company
7025 West 66th Place, Chicago 38, Illinois
Representative—T. E. Shine

M. W. Parsons—Plymouth, Inc.
59 Beekman St., New York City 38, New York
Representative—Herbert Bye

Synthetic Products Company
1636 Wayside Rd., Cleveland 12, Ohio
Representative—Garry B. Curtiss

Swift & Company
165th & Indianapolis Blvd., Hammond, Ind.
Representative—F. H. Beneker

Trendex Division, The Humko Co.
P. O. Box 4607, 1702 N. Thomas St.
Memphis, Tennessee
Representative—W. J. O'Connell

Vegetable Oil Products Co., Inc.
Vopcolene Division
5568 East 61st Street, Los Angeles 22, Calif.
Representative—C. F. Williams

Witco Chemical Company
75 East Wacker Drive, Chicago 1, Illinois
Representative—E. F. Wagner

TECHNICAL AND RESEARCH ORGANIZATIONS

Battelle Memorial Institute
505 King Avenue, Columbus 1, Ohio

Institut Francais du Petrole
CMrR—Courtel, 4 Place Bir Hackeim
Rueil—Malmaison (S. et Oise) France

Les Laboratoires de Recherches Purfina
31 rue de la Loi, Bruxelles, Belgium
Representative—R. Gillerot

Midwest Research Institute
425 Volker, Kansas City 10, Missouri
Representative—Dr. M. H. Thornton

National Rosin Oil Products, Inc.
1270 Ave. of the Americas, N.Y. City 20, N.Y.
Representative—Richard Bender

Petroleum Educational Institute
9020 Melrose Avenue, Los Angeles 46, Calif.
Representative—G. A. Zamboni

Phoenix Chemical Laboratory, Inc.
3953 W. Shakespeare Ave., Chicago 47, Ill.
Representative—Mrs. G. A. Krawetz

Products Development Laboratory
1 Market St.
West Warwick, Rhode Island

Chassis Lubrication

A Few Physical Facts of Life

By J. B. Stucker
Pure Oil Research Laboratories
Crystal Lake, Illinois

Author J. B. Stucker inspecting upper ball joint suspension.

We will take our text from the book of Carl, fourth chapter, first to fourth verses, and fifth chapter, first verse. At that time Carl said unto the unbelievers:

"As a first requirement, a chassis grease should provide effective lubrication of chassis parts, should be drip resistant and have a long life before relubrication is necessary. These properties are necessary to satisfy the final consumer, the vehicle owner. As a second requirement, the grease should be capable of ready pumping and dispensing through the many different types of grease gun equipment found in service stations and garages. This property is necessary to satisfy the service station or garage operators who must apply the grease. Unfortunately, these two requirements are almost diametrically opposed insofar as the formulation of the grease is concerned."

Carl, of course, is Carl Georgi and the unbelievers were the audience at the NLGI symposium on pumpability of greases and delivery characteristics of dispensing equipment held in Chicago in 1946. I would like to show you how things haven't changed a great deal since 1946 and at the same time explain a few of the things about chassis grease that every young engineer should know.

Some years ago we carried out a program on retention characteristics of chassis grease on a series of four experimental greases prepared with calcium soap and different viscosity mineral oils of 300, 750, 2500, and 4200 Saybolt universal seconds viscosity at 100°F. All greases were in the No. 1 NLGI consistency grade range and with the exception of the grease prepared with the 300 Saybolt second oil, the soap contents were approximately the same. The grease containing the 300 second oil contained appreciably more soap than the other three.

Tests in Evaluation

Tests were conducted during the summer months in passenger cars and truck fleets. In the case of the passenger cars, we attempted to evalute the greases by ease of steering and the squeak and rattle characteristics as mileage accumulated, and as a secondary check by something along the lines described earlier today by John McGrogan where the ride was checked before and after a grease job. In the case of the truck test, we merely furnished drums of the different greases to a few friendly

fleet operators and asked that they evaluate the greases by any means they wished and then tell us which grease they liked the best.

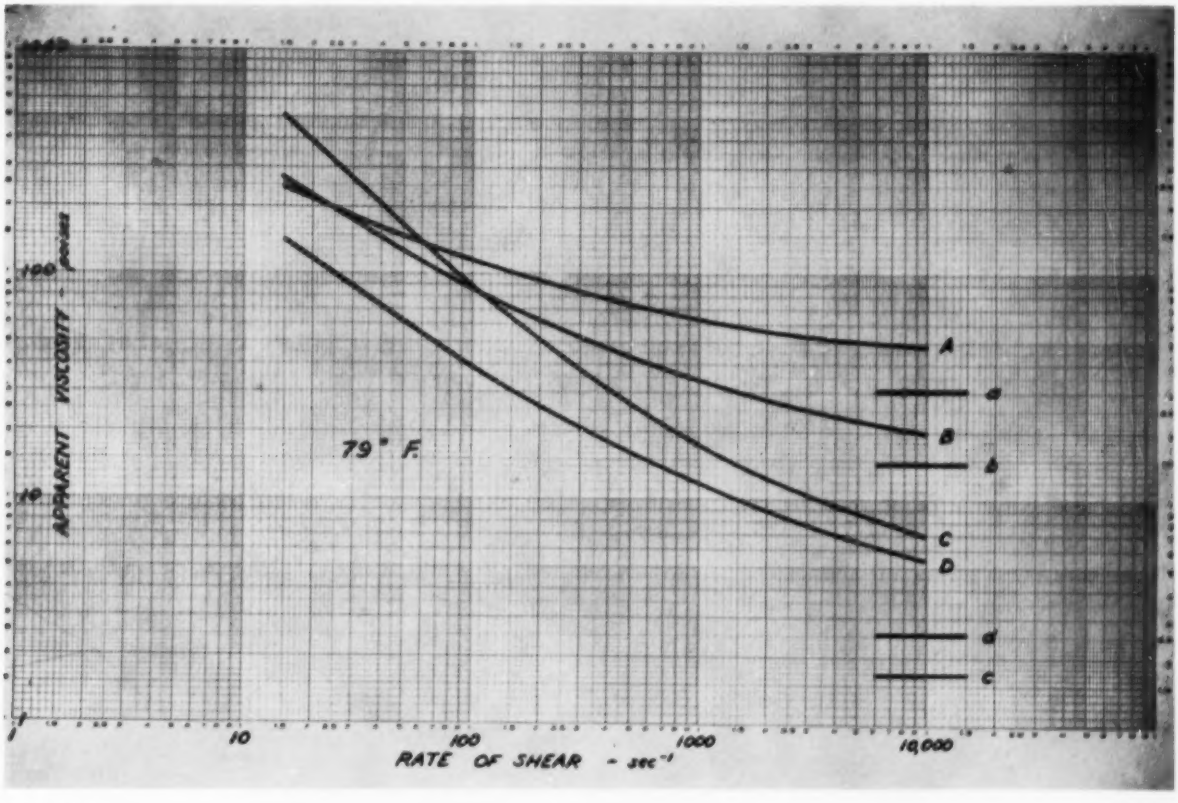
The first reaction of the people involved in dispensing the experimental greases was that the greases prepared with the high viscosity mineral oils could not be pumped. In most cases, what they actually meant was that the grease could not be pumped as readily as the material they had been using in their dispensing equipment, and they did not like to take the extra time required to pump the higher viscosity greases. Our laboratory-controlled passenger car tests led us to believe that the greases prepared with the 4200 Saybolt second mineral oil was probably the best performer from the standpoint of retention characteristics. The verdict of the truck fleet operators was more definite—they demanded that we furnish the 4200 second oil material as a regular item or they would cancel the crankcase and gear oil business that we enjoyed with them.

Flow Properties Illustrated

I have a few slides that illustrate the flow properties of these experimental greases over the temperature range from 79 to 130°F. and covering a range of rate of shear from approximately 10 reciprocal seconds to 10,000 reciprocal seconds. A study of the apparent viscosity rate of shear curves of these greases offers a few clues on the probable reasons for their performance in the field.

Figure 1 illustrates the flow properties of the four greases at 79°F. Grease "A" contained the 4200 SUS at 100°F. oil; Grease "B," the 2500 SUS at 100°F. oil; Grease "D," the 750 SUS at 100°F. oil; and Grease "C," the 300 SUS at 100°F. oil. For comparative purposes, the viscosity of the mineral oils used in the greases are indicated by the lower case letters a, b, d, and c as shown at the right of the short lines in Figure 1. The viscosity of the mineral oil is, of course, independent of rate of shear in this range of shear rate and would extrapolate horizontally back to the Y-axis. It will be noted that at very low shear rates the curves are relatively close together, but as shear rate increases the curves begin to spread apart, lining up in the order of viscosity of the base mineral oil. The one exception is Grease "C" which shows a higher apparent viscosity at high shear rate than does Grease "D" in spite of the fact that Grease "D" contains 750 SUS at 100°F. oil, while Grease "C" contains 300 SUS at 100°F. oil. This apparent anomaly is explained by the fact that Grease "C," as mentioned earlier, contained considerably more soap than the other three and the effect of the high soap content can be seen over the entire curve, especially at very low shear rates where soap content is the primary factor in apparent viscosity. If we forget Grease "C" for the moment, it will be noted that the apparent viscosities of the greases are in the same order as the viscosities of the

Figure 1. The flow properties of four experimental greases are illustrated at a temperature range of 79°F. Grease A contains 4200 SUS at 100°F. oil, grease B, the 2500 SUS at 100°F. oil, grease C contains the 300 SUS at 100°F. oil, and grease D, the 750 SUS at 100°F. oil.



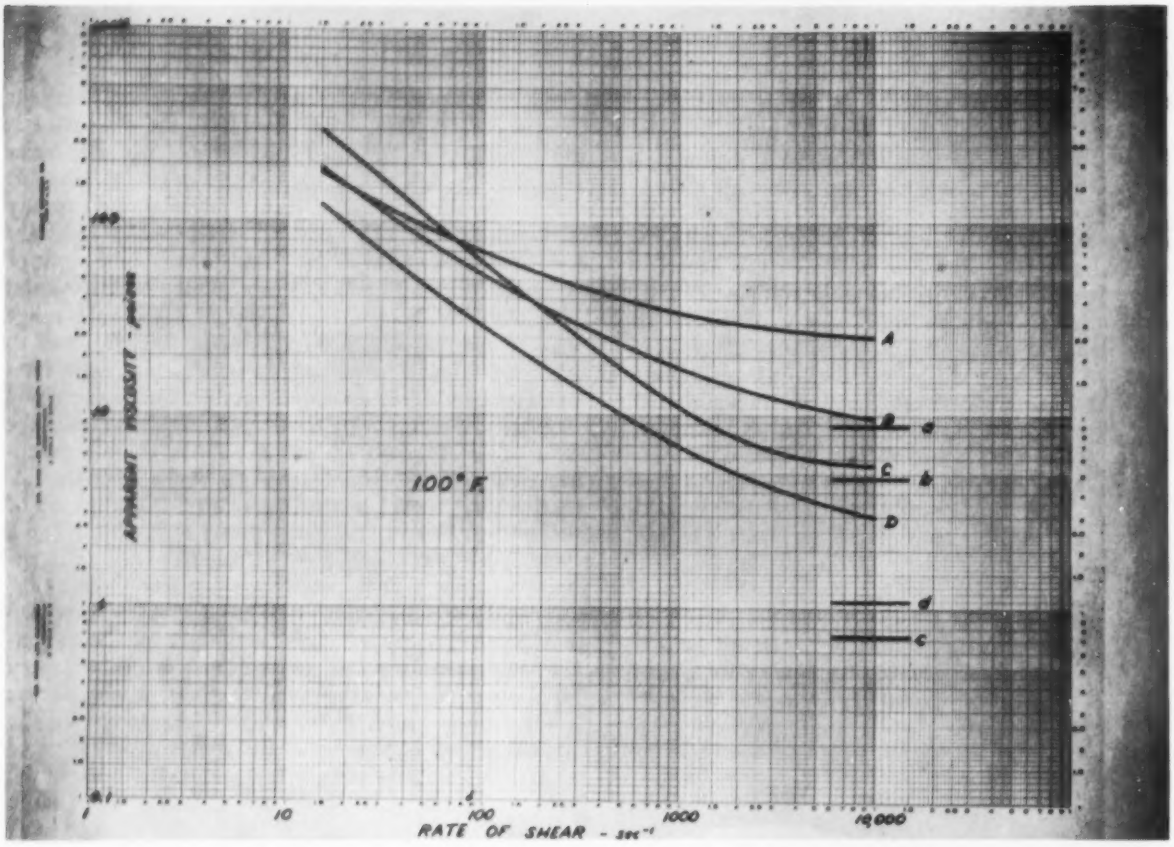


FIGURE 2

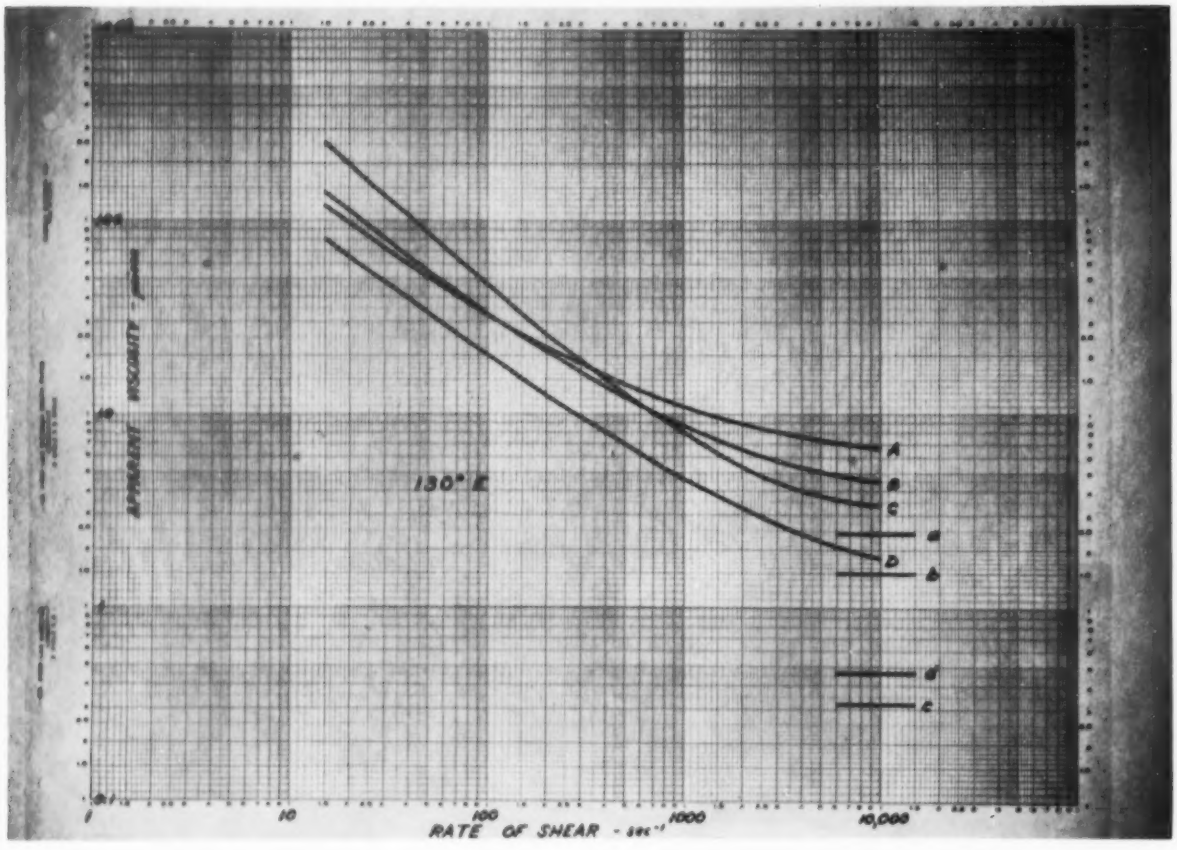


FIGURE 3

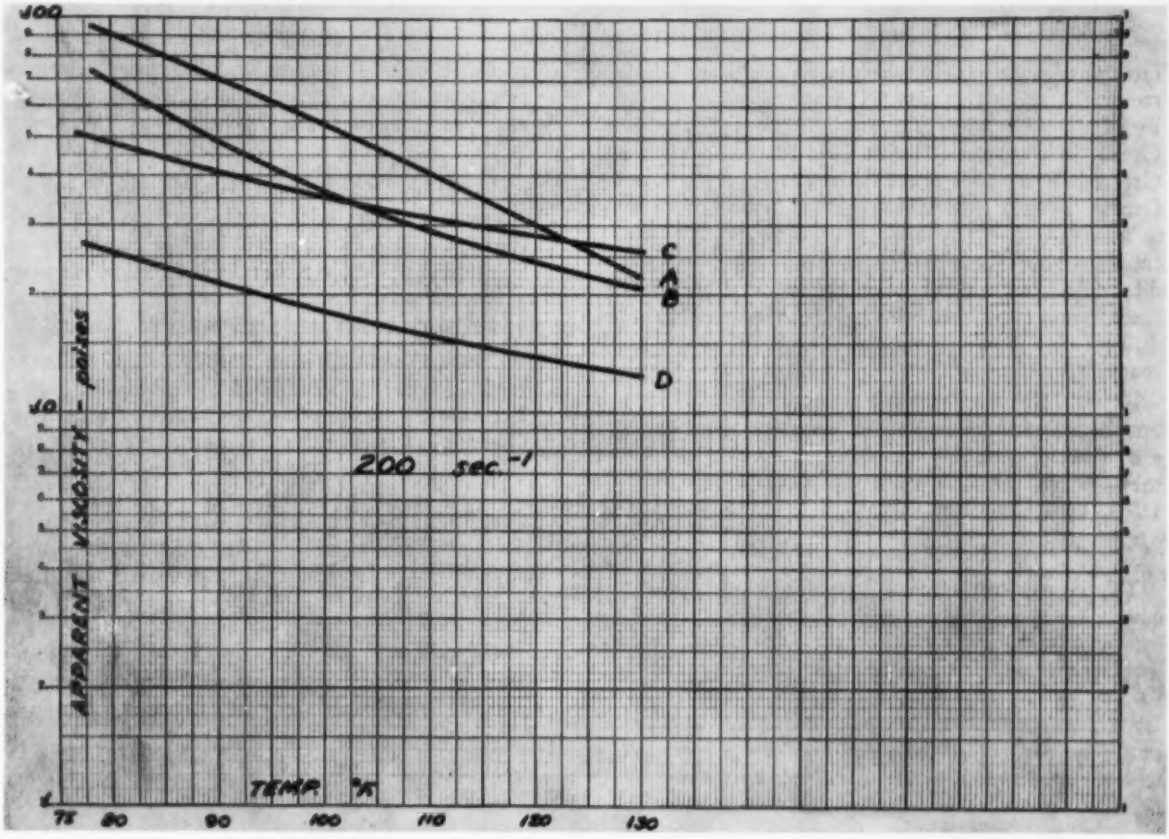


FIGURE 4

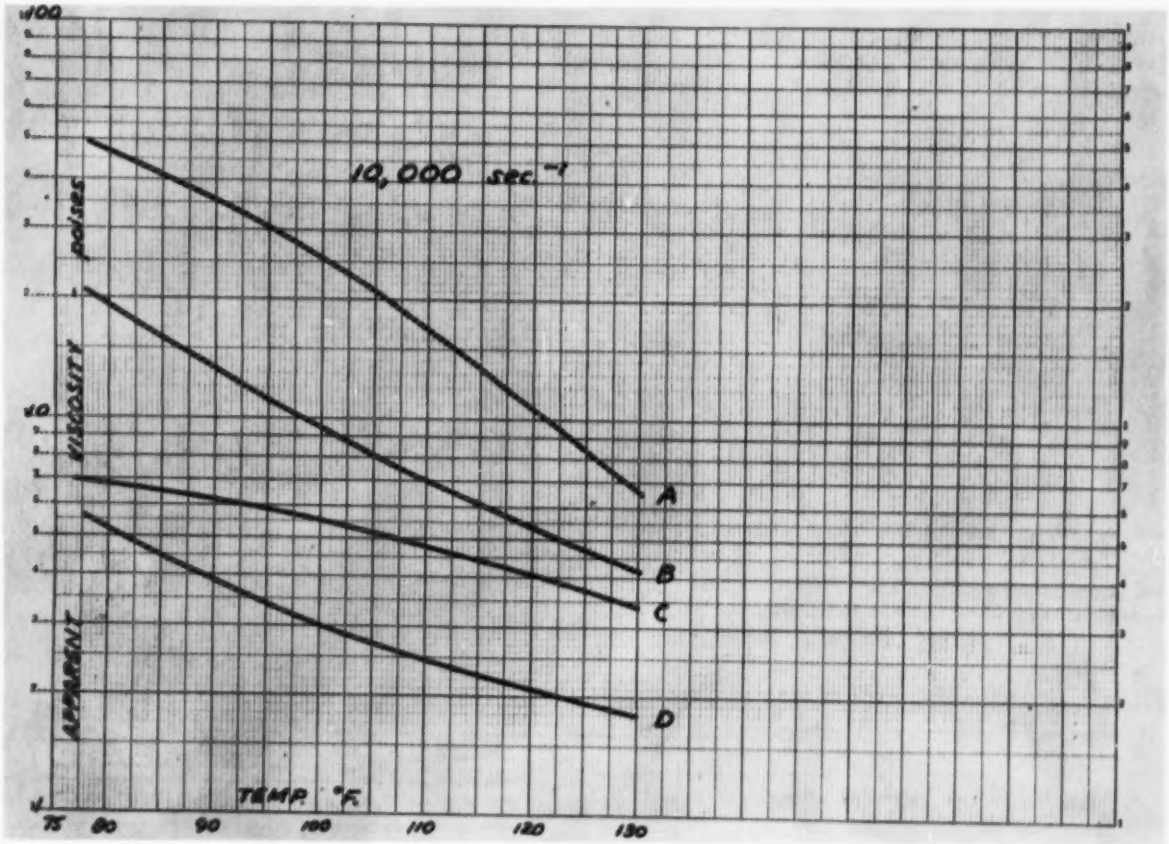


FIGURE 5

mineral oils. At high shear rates of the order of 10,000 reciprocal seconds, Grease "A" shows an apparent viscosity of about 50 poises; Grease "B," about 20 poises; and Grease "D," about 7 poises. To put it another way, Grease "A" has over twice the resistance to flow as does Grease "B" and approximately seven times the resistance to flow as does Grease "D." This apparent viscosity, or resistance to flow, at high shear rates appears to correlate directly with the ability of the grease to "stay put" in shackles and other chassis fittings under shock impact conditions, such as are encountered in driving over bumpy roads.

Figure 2 illustrates the same trends noted in Figure 1, but in this case the data were determined at 100°F. and the apparent viscosity values are naturally lower than they were at 79°F. Figure 3 shows data determined at 130°F. with similar trends.

Temperature vs. Apparent Viscosity

To illustrate the effect of temperature on apparent viscosity, we might study the curves in Figure 4, which illustrates the behavior of the greases at a relatively low shear rate and over the temperature range from about 80 to 130°F. The low shear rate range of 200 reciprocal seconds might be considered as being somewhere in the range involved in the dispensing of the greases, and it will be noted that appreciable differences are shown, especially around 80°F., for the apparent viscosities of Greases "A," "B," and "D." Grease "C," of course, displays its abnormal behavior because of its high soap content. The value of the apparent viscosity of a particular grease in this shear rate range appears to be directly related to the ease of pumping and dispensing determined for this series with the higher apparent viscosity greases being more difficult to pump than their lower viscosity relatives.

High Shear Rate Involved

Figure 5 illustrates the same type of data as did Figure 4, except that high shear rate is involved and the remarks made earlier with reference to retention characteristics in field tests and their relation to apparent viscosity apply as well for the data in this figure.

Figure 6 shows the same type of data as is illustrated in Figure 1 and was determined about ten years ago in our Laboratories in connection with a similar grease program. Grease "A" was of No. 1 consistency grade and contained 300 SUS at 100°F. oil. Grease "B" was likewise No. 1 consistency, but contained 750 SUS at 100°F. oil. This graph illustrates the typical flow properties as normally illustrated on log-log coordinates. If you are unable to think in terms of logarithmic functions, the graphs are apt to be misleading and for the layman it is interesting to see what the curve of Grease "A" looks like when the data are plotted on rectangular coordinates with the viscosities expressed in terms of Saybolt seconds with which most of us are more familiar. This has been done in Figure 7 and the nature of the apparent viscosity shear rate curve can be seen immediately.

It is our belief that suitable chassis greases and the proper dispensing equipment exist today to give the motorists the ride they demand and need, and it is merely a question of bringing the two together to achieve the desired results.

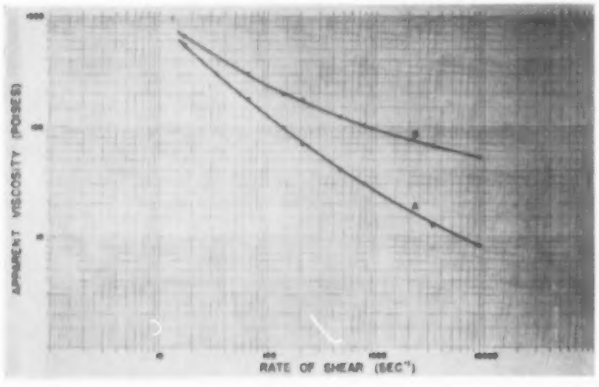


Figure 6. "Shows the same type of data as is illustrated in Figure 1 and was determined about ten years ago . . . it illustrates the typical flow properties as normally illustrated on log-log co-ordinates."

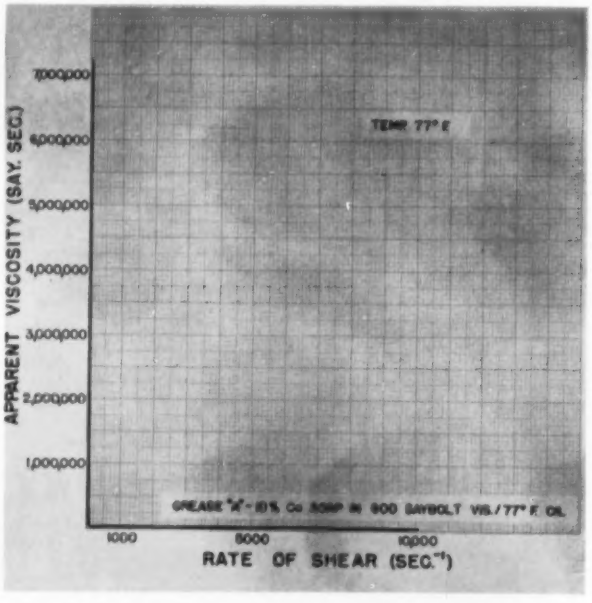


Figure 7. For the layman unaccustomed to logarithmic functions, grease A is plotted on rectangular coordinates with viscosities expressed in terms of Saybolt seconds. Black rule is apparent viscosity shear rate curve.

This article was presented at the SAE Summer Meeting in Atlantic City, June 1955.

helping you improve your grease

with over 30 years of stearate experience

that's our business

Mallinckrodt's vast store of stearate knowledge pays off for you in two ways:

. . . specialized technical service to help you solve problems related to the application of stearates.

. . . a complete line of aluminum stearates that gives your greases the exact qualities demanded by your market.

high efficiency

Aluminum Stearate D-49 yields up to 25% more grease than conventional soaps and still maintains good stability. It also yields greases with higher dropping points than those generally obtained with other aluminum soaps.

moderate gelling

Aluminum Stearate D produces smooth, stable greases under a wide range of conditions . . . can be used with D-51 for higher yields.

SPECIAL STEARATES FOR SPECIAL GREASES

Let Mallinckrodt stearates and technical service help you improve *your* grease. *Write us about your needs today!*

Mallinckrodt®

MALLINCKRODT CHEMICAL WORKS

Mallinckrodt St., St. Louis 7, Mo. 72 Gold St., New York 8, N. Y.

CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES • PHILADELPHIA • SAN FRANCISCO

In Canada: MALLINCKRODT CHEMICAL WORKS LIMITED—MONTREAL • TORONTO

Manufacturers of Medicinal, Photographic, Analytical and Industrial Fine Chemicals

Patents and Developments

Mixed Alkaline Earth Metal Soap Greases

The preparation of calcium base greases as such is old in the art and is well described in the patent literature. Such greases are excellent in structure, water resistance and appearance. However, the high temperature stability of calcium greases is very poor. This is due to the necessity of incorporating water with the calcium soaps during their preparation. At temperatures above about 200°F. the water of formulation is driven off and the grease structure breaks down.

It has been found (U.S. Patent No. 2,708,659) that calcium greases may be improved by the incorporation of minor amounts of magnesium, barium or strontium metal soaps. These investigations have also pointed out that a combination of strontium and barium soaps show no attractive properties.

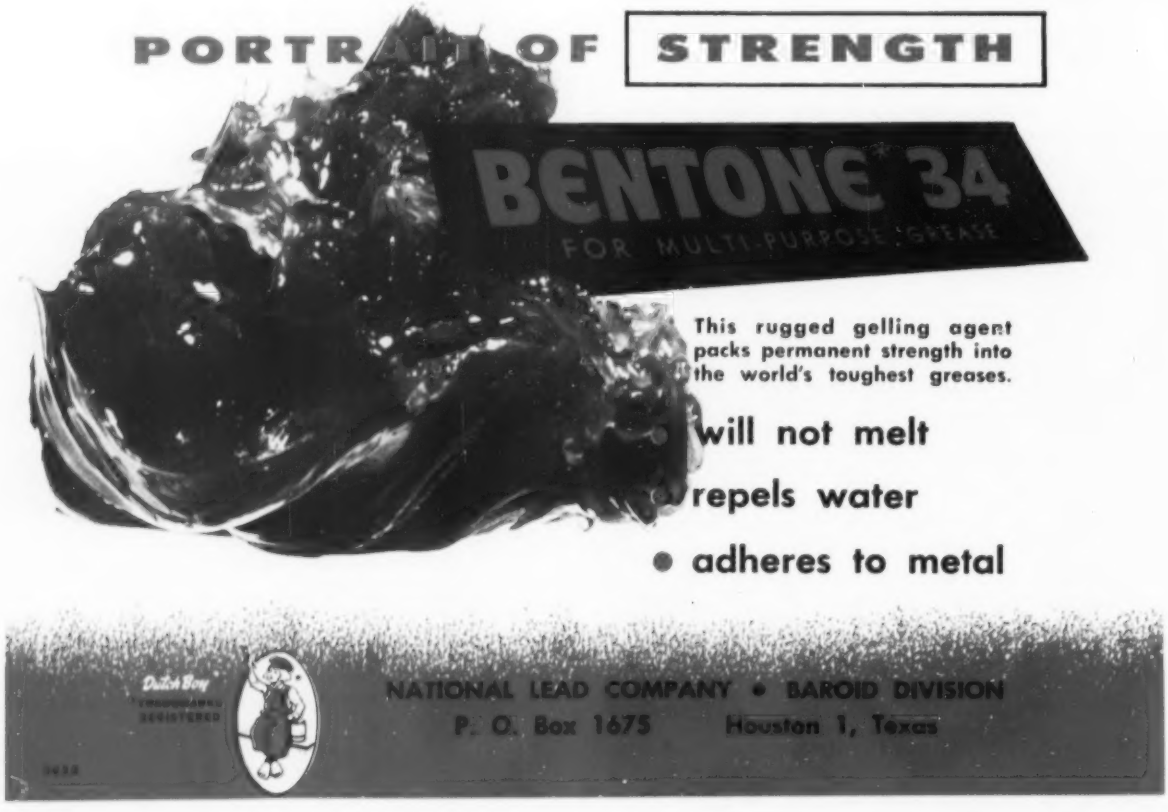
According to U.S. Patent 2,733,208 issued to Esso Research and Engineering Company, a combination of calcium, barium and strontium soaps result in a lubricating grease composition which combines the excellent structure, water resistance and appearance of the calcium soaps with excellent high temperature stability.

Briefly stated, the grease compositions are prepared by thickening to a grease consistency a lubricating oil base stock with a mixture of the calcium, barium and strontium soaps of high molecular weight fatty acids. The greases of this invention are prepared by methods of manufacture familiar to the art and the preparation presents no special problems. Care must be taken only to prepare the most insoluble soap first, followed by the lesser soluble soap and the most soluble soap.

The preparation involves the thorough admixture of the fatty acid used with a portion of the oil base and the addition of hydroxide of the metal which forms the most insoluble soap. The metal hydroxide is usually added in the form of a dry powder or an oil slurry. After the saponification is completed, the second most insoluble metal hydroxide is added followed by the third and last metallic component. The total mixture is then dehydrated and heated to about 350°F. The remainder of the oil is then added with stirring and the final product cooled without further agitation.

The thickening agent of the greases consists of a mixture of the calcium, barium and strontium soap from any of the above mentioned high molecular weight fatty acids. The ratio of the three soaps used will vary from about 5 to 1 to 1 mol of calcium, barium and strontium soaps respectively to about 1 to 5 to 5 mols. The preferred compositions of this invention will contain equimolar proportions of these soaps.

The amount of the total soap mixture that is utilized will depend upon the consistency desired in the final


PORTRAIT OF STRENGTH
BENTONE 34
FOR MULTI-PURPOSE GREASE
This rugged gelling agent packs permanent strength into the world's toughest greases.
will not melt
repels water
adheres to metal
Dutch Boy
NATIONAL LEAD COMPANY • BAROID DIVISION
P. O. Box 1675 Houston 1, Texas

product. Ordinarily from about 5% by weight to 30% by weight with from about 10% to about 25% being especially preferred. To illustrate this invention the following example is given.

EXAMPLE 1

FORMULATION

Ingredients:	*Weight per cent*
Hydrogenated fish oil acids	15.00
Calcium hydroxide	0.72
Strontium hydroxide octa-hydrate	2.60
Barium hydroxide octa-hydrate	3.10
Mineral oil (70 SUS/210°F.)	78.58

PREPARATION

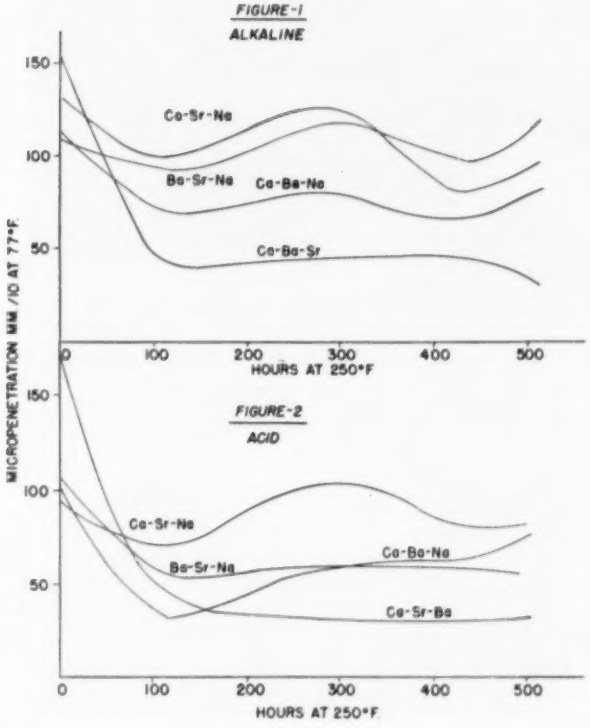
The total charge of the acids and the dry calcium hydrate were mixed with one third of the mineral oil and heated until saponification was complete. The barium hydroxide was then added and after complete saponification the strontium hydroxide was added. The soap mixture was subsequently dehydrated and heated to about 350°F. The balance of the mineral oil was then added gradually while the mixture was being agitated. The final product was cooled without further agitation. The mol ratio of the soaps of this grease was 1:1:1.

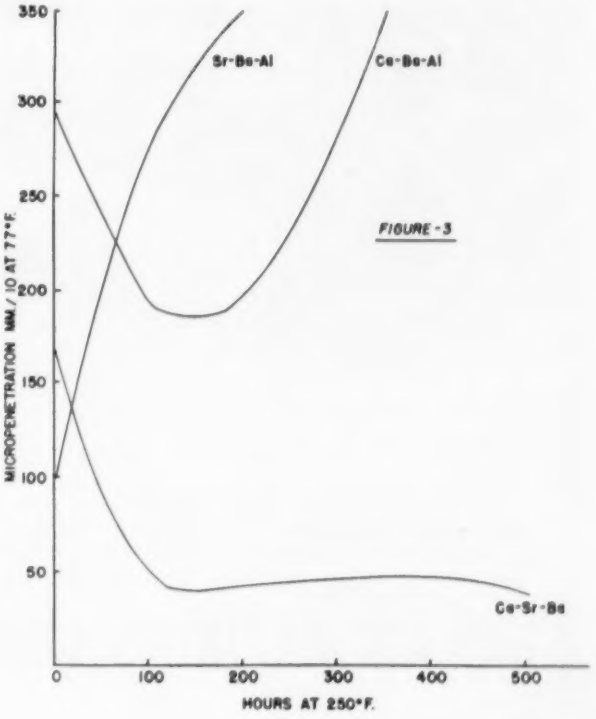
It is not possible to use any combination of three soaps arbitrarily. Only the greases of invention are satisfactory. For instance, if sodium is substituted for any of the three alkaline earth metals, the resulting greases bear the mark of weakness of soap structure. This is shown in Figure 1 in which the worked micropenetrations of these greases are shown as a function of the storage time at 250°F. The oven storage test enables one to differentiate between the heat stable and heat unstable greases. This differentiation can be directly related to the stability of the structure arrangement of the soap molecules. While the alkaline earth mixture is not sensitive to a storage time of 500 hours at 250°F., the sodium-containing greases appear to soften and to be subject to transitions. That the alkaline earth metal greases are not sensitive to the presence of free fatty acids or free alkali is shown if Figure 1 and Figure 2 are compared. The sodium soap containing greases have poor yields when free fatty acids are present and indicate that the structure of the sodium soaps is more sensitive to free acids than the alkaline earth soap. The dropping points appear not to be dependent upon free acidity or alkalinity.

Figure 3 shows the results of the oven storage test for mixtures of alkaline earth metal soaps with aluminum soap.

Mixed Soap-Complex Greases of High Temperature and Structure Stability

In U.S. Patent 2,734,030 also issued to Esso Research and Engineering Company, there is described the incorporation of a salt of a low molecular weight acid in the complex form with the high molecular weight acid soap to give better high temperature performance and increased structure stability. The following directions are given in the preparation of the grease composition:





The Mixed Soap Base

The mixed soap base which serves as the thickening agent for the improved grease compositions comprises a mixture of the calcium soap of high molecular weight fatty acids and a soap of a metal selected from the class consisting of barium, strontium, and magnesium.

The high molecular weight fatty acids operable in preparing the mixed soaps may be selected from the well known grease-making materials which include oleic acid, stearic acid, hydroxy stearic acid, hydrogenated fish oil acids, glycerides, tallow, beef fat, and the like, including mixtures of the above in any proportion. Fatty acids having carbon chain lengths of from about 12 to 24 carbon atoms, and mixtures thereof, are especially preferred. Hydrogenated fish oil acids are examples of these preferred acids.

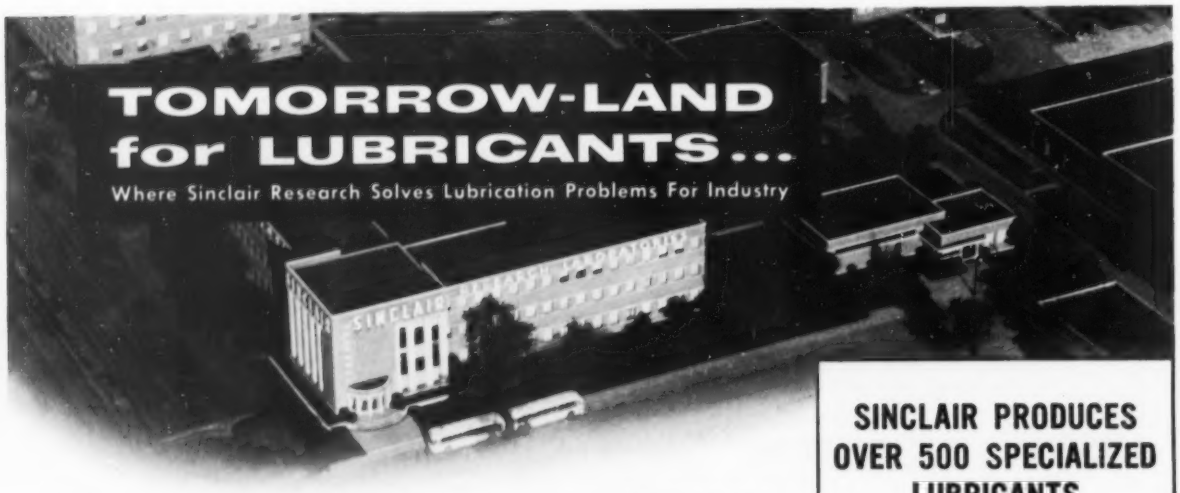
The calcium soap must be present in amounts ranging from about 2.5% to about 15.0% by weight, based on the weight of the finished formulation. The amount of the soap of the second metal used is such that the mol ratio of the calcium soap to the second soap is within the range of from 8:1 to 1:8, with a mol ratio within the range of from 8:1 to 3:1 being especially preferred. The amount of the combined soaps present will depend somewhat upon the desired final consistency of the product. Ordinary usage would call for a grease composition according to the instant invention containing from about 5.0% to 30.0% by weight of the combined soap, with a range of from 10.0% to 20.0% being especially preferred.

The Complexing Salt

The low molecular weight organic acid salt which is used to form the complex with the mixture of high molecular weight acid soaps can be derived from any number of organic acids having from one to six carbon atoms. The use of acetic or propionic acid is desirable, with acetic being preferred and used in the preferred embodiment. The metal used may be selected from the class consisting of calcium, barium, magnesium, or strontium, with the former being preferred. The salt may be added to the soap mixture in the form of a slurry of the dry salt and oil, in the form of the dry salt, or it may be prepared in situ. The amount of the salt used will be such as to result in a mol ratio of the total soap to salt of about 0.70 to about 1.2. Mol ratios of greater than 1.2 or less than 0.7 will not produce the results desired. A mol ratio of mixed soaps to the salt of from 0.75 to 1.0 is especially preferred.

The Lubricating Oil Base

The lubricating oil which is utilized as a dispersant for the soaps in preparing the greases of invention may be selected from a wide variety of lubricating oils. A mineral lubricating oil preferably of naphthenic origin may be chosen as the base. It should have a viscosity within a range of from about 40 SUS at 100°F. to about 4000



Located at Harvey, Illinois, is one of the most extensive installations of its kind in the world—Sinclair Research Laboratories. These facilities are an important part of Sinclair's investment in the future. Here is where Sinclair engineers and chemists work to develop new products and improve the quality of existing ones. At these famous laboratories were developed the Sinclair lubricants now solving difficult problems in all branches of industry. If you have a special lubrication problem, write today to Sinclair Refining Company, Technical Service Division, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR PRODUCES OVER 500 SPECIALIZED LUBRICANTS for

TURBINES
DIESEL ENGINES
PLANT MACHINERY
METAL WORKING
AUTOMOTIVE EQUIPMENT
and many other applications

SINCLAIR REFINING COMPANY

SUS at 100°F. As in the preparation of most grease compositions, the mineral oil chosen should be that lubricating oil which would be used to furnish proper lubrication if a liquid oil could be used. It is preferred to use a mineral oil having a viscosity of from about 200 to 1500 SUS at 100°F. to formulate the greases of the preferred embodiment.

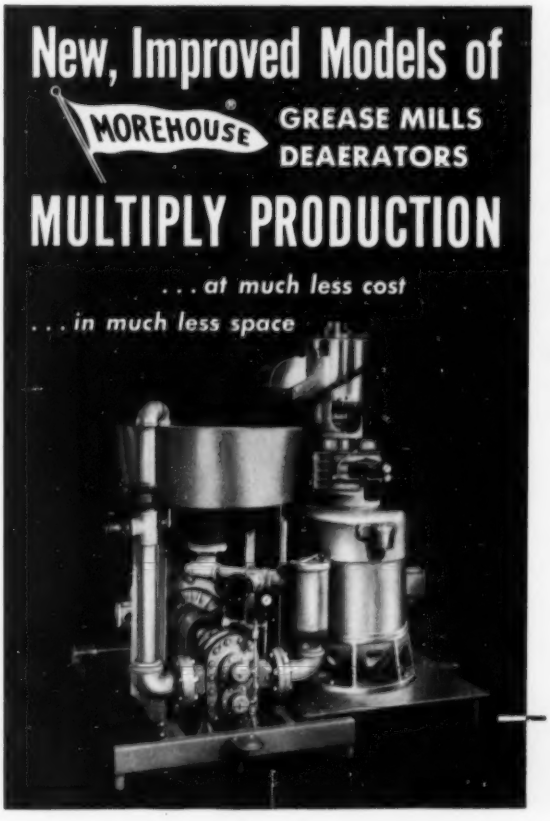
Although a mineral lubricating oil, such as a conventionally refined distillate, is preferred for the preparation of the improved greases of invention, a synthetic oil may also be utilized as the dispersing agent. Although a synthetic lubricant of the ester type is preferred, such as the esters of dibasic acids and long chain alcohols, other well known synthetic lubricants may be used. Complex esters made from dibasic acids, glycols, and alcohols, may be used, as may the polymerized glycol esters, glycol ethers, polymerized olefins, alkylated aromatics, polymerized silicones, formals, mercaptals, and the like. The only requisite for the oil base is that the one chosen be one that will furnish the desired lubrication when utilized as a grease.

Method of Preparation

Two process limitations apply to the manufacture of the instant grease formulations; namely, the dispersion of the calcium soap prior to the dispersion of the second soap and heating the total formulation to a temperature of at least 350°F. after dehydration. The exact reasons are not known why these limitations are critical, but again it is believed that the solution of the calcium soap in the oil aids in the dispersion of the second soap and that above 350°F. there is a phase transition of the soap mixture which produces a new arrangement of molecules that is stable both at low and elevated temperatures. It is also essential to raise the mixture to these high temperatures in order to form the complex of the mixture of soaps and the salt, a complex which is believed to be largely responsible for the excellent high temperature and shear stability properties obtained.

The method of manufacture of the greases may be generally described as follows.

The mixture of high molecular weight soap is prepared first by saponifying a part of the saponifiable material with calcium hydroxide in the presence of one third of the total amount of base oil. Then barium hydroxide is added in the form of a slurry or as a dry powder to saponify the remainder of the fatty acid. Calcium acetate or barium acetate, as the case may be, is then added as a dry powder or as a water or oil suspension, or if desired it may be formed in situ. The soaps are dehydrated and heated to above about 350°F. The remainder of the base oil is then added and the mixture heated to 450°F. to 480°F. At that temperature the mixture is a homogeneous semi-solid mass. While stirring continuously the grease is cooled until the temperature is in the neighborhood of 150°F. The stirring is then stopped, and the grease cooled to room temperature. It is then thoroughly



Let us prove it in your plant . . . at our risk!

The performance of these units in installations throughout the world is so outstanding we want to demonstrate their advantages to you—without obligation to buy.

You can expect the demonstration to prove . . .

1. Morehouse Mills will produce greases of higher quality up to four times faster than other mills. New models feature improved handwheel adjustment and new micrometer setting and positive lock which insure your absolute control of end product with just the right degree of deagglomeration and dispersion of fillers and additives. Additional features include magnetic removal of tramp metal and many other advancements.

2. For greases that require deaeration the Morehouse Deaerator removes entrained air, increases weight 20 to 40 pounds per drum; improves quality, stability and appearance; saves storage space, working area and shipping and handling costs.

The all-over result is you can up-grade your product, enjoy greater customer satisfaction and—

Make more profits with MOREHOUSE

Let us prove it at our risk. Write today for complete details. MOREHOUSE-COWLES, INC., 1150 San Fernando Rd., Los Angeles 65, Calif. Representatives in Principal Cities (Cable Address "MORESPEED," Los Angeles)

Many models to choose from— Illustrated is Model B-2005 with Model "E" Deaerator, capacity 25,000 lbs. per hour.

MOREHOUSE COWLES

5604

worked, as by passing through a Morehouse mill or other well known working device.

It seems clear that the combination of an alkaline earth metal salt of low molecular weight acids with a mixture of two alkaline earth metal soaps of high molecular weight fatty acids produces a grease that is superior to either one formed from a mere combination of low molecular weight salts and a single high molecular weight soap, or a mixture of two high molecular weight soaps alone. Calcium acetate seems to be the most effective complexing agent, with barium acetate being very acceptable.

New Items

Industrial petroleum jellies: Properties and main uses (Chemical Trade Journal December 30, 1955, page 1761).

Spontaneous ignition studies relating to lubricants of reduced flammability. Influence of structure of the alcohol moiety on spontaneous ignition temperature of dialkyl azelates; spontaneous ignition temperatures of organic phosphorus esters with predominently aliphatic structures–Mecklenborg (NACA Tech. Note 3560).

Grease analysis: Physical and Chemical procedures of ordinary lab. tests and their significance (Lubrication January, 1956).

Worm gear lubrication: Effect of oil viscosity on power losses and wear–Tourret (Engineering December 30, 1955, page 888).

KEL-F No. 90 grease, a new-type stopcock grease available from Scientific Glass Apparatus Co., Bloomfield, New Jersey, is a fluorocarbon lubricant for metal, glass, plastic or ceramic parts. It is said to offer extreme lubricity, to be chemically resistant, and easily removed (Tech. Survey, 1956, page 132).

U.S. Patent 2,728,486 (Rockwell Mfg. Co.) Unitary valve lubricating apparatus for dispensing plastic lubricant of usual plug valve viscosity.

U.S. Patent 2,729,305 (Frederic L. Hamel) Grease packer for antifriction bearing.

U.S. Patent 2,729,369 (Henri A. Chinchole) Grease gun.

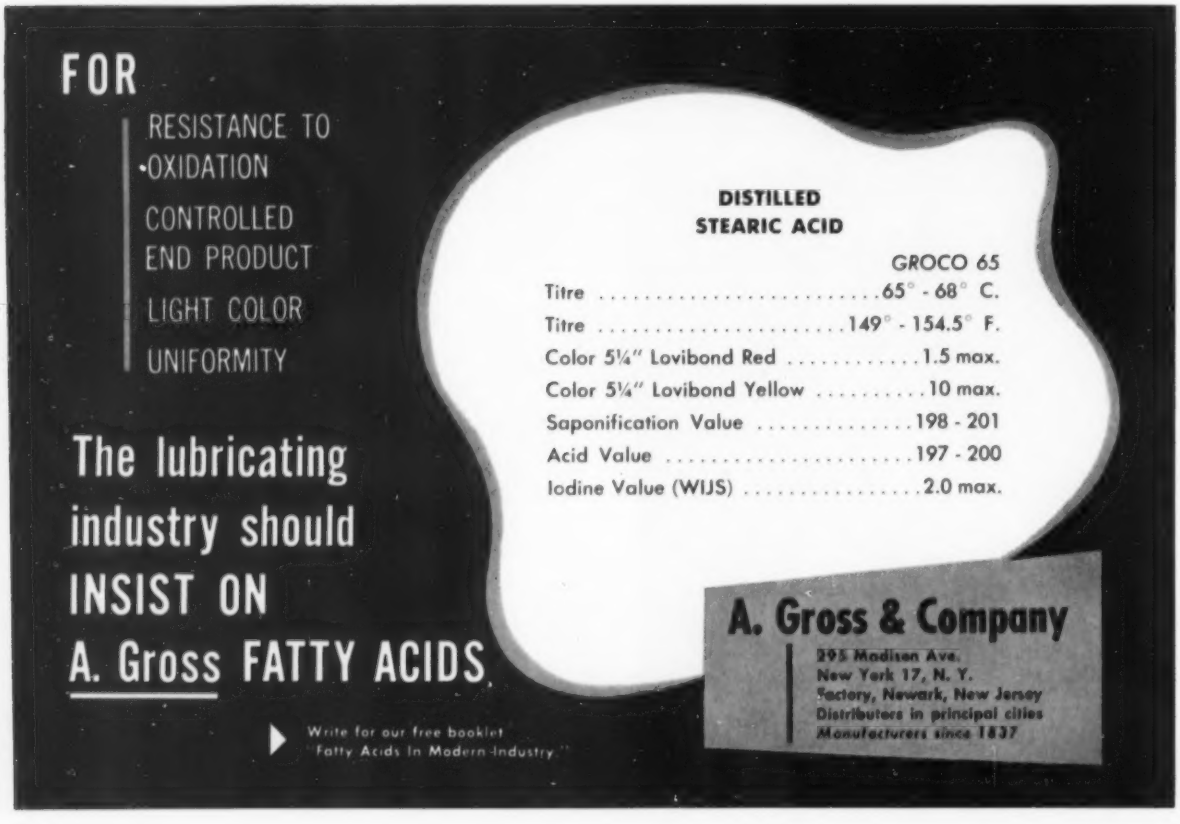
U.S. Patent 2,731,655 (George E. Newberry) Grease fitting cleaner.

U.S. Patent 2,735,585 (Balcrank, Inc.) Sealed follow-plate for lubricant dispensers.

U.S. Patent 2,736,481 (Norman C. Currell) Grease packaging, and grease dispensing means for grease guns.

Diamonds in the Rough

Diamonds are an oil man's best friend–in tough drilling areas. Half-carat industrial diamonds are welded onto core drilling bits to give the tools more "bite." Some of these rock bits–veritable "Big Berthas" of the oil industry–are set with as many as 730 fairly uniform, half-carat stones, and cost over 3,500 dollars. Because of the expense involved, diamond coring bits are not used when another tool will do the job. The diamond core bit is a good example of the costly tools that oil men must constantly perfect to help them in their never-ending race to keep ahead of consumer demand for petroleum products.


FOR
RESISTANCE TO OXIDATION
CONTROLLED END PRODUCT
LIGHT COLOR
UNIFORMITY
The lubricating industry should INSIST ON A. Gross FATTY ACIDS
Write for our free booklet "Fatty Acids In Modern Industry"
DISTILLED STEARIC ACID
GROCO 65
Titre .....65° - 68° C.
Titre .....149° - 154.5° F.
Color 5¼" Lovibond Red .....1.5 max.
Color 5¼" Lovibond Yellow .....10 max.
Saponification Value .....198 - 201
Acid Value .....197 - 200
Iodine Value (WIJS) .....2.0 max.
A. Gross & Company
295 Madison Ave.
New York 17, N. Y.
Factory, Newark, New Jersey
Distributors in principal cities
Manufacturers since 1837

NEW MEMBER

Alpha Molykote Corporation Joins

NLGI Welcomes Alpha Molykote as an Active Member

Although less than ten years old, The Alpha Molykote corporation has become the world's leading processor and supplier of molybdenum disulfide lubricants for industry. Packaged and merchandised under the trade name "MOLYKOTE," these lubricants are being used by every industrial nation in the world to reduce friction, galling, seizing or fretting in lubrication's "fringe area"... where extreme bearing pressures or excessive temperatures limit the effectiveness of conventional oils and greases.

Alfred Sonntag, president, has been identified here and abroad primarily with the development and manufacture of the materials testing equipment which bears his name. Among them, The Sonntag simulated service testing machines, fatigue testing machines, impact testers, and universal static testing machines are the most prominent in a group which also includes some large machines for testing lubricants under actual service conditions such as full size gear test stands and a railway journal bearing tester for the A.A.R. These machines are sold by Sonntag Scientific corporation, a division of Baldwin-Lima-Hamilton Corp.

Lubricant Search Leads to Molykote

In 1948, Sonntag's testing machine organization undertook a systematic search for new materials or combinations which would be useful to counteract fretting in highly loaded, high speed, vibration testing equipment. This search eventually led to the development of the line of molybdenum disulfide lubricants which the corporation now markets under the trade name MOLYKOTE.

The early development of MOLYKOTE lubricants was aided in great measure by the full realization of the concept that *"extreme pressure," or boundary lubrication, without the participation of solid lubricants is practically impossible.*

Whether we rely on solid lubricants which are already on the surface in the form of oxides or on suspended solids carried into E.P. areas by liquids, or on solids manufactured by E.P. additives in chemical reaction with the bearing surfaces, appeared to be somewhat inconsequential in this basic concept. The result was that Alpha, in search for highly qualified solids, investigated hundreds from the groups of laminar solids, metal sulphides, waxes, stearates, soft metallic and non-metallic powders, clorides and iodides, of which highly purified MoS_2 exhibited, by far, the best overall qualifications.

Research an Important Factor

Alpha's basic research and development group is located at the Institute of Technology, Munich, Germany. This group is headed by Professor Ing. habil G. Spengler, who is also Director of Lubrication Research for the German Institute of Aeronautics.

A modern chemical and physical laboratory is maintained at the Stamford, Connecticut, plant under the direction of Chief Chemist Alfred Lewis. The basic function of this facility is product control and development. A secondary, but most important task of the Stamford laboratories is the compilation, classification and evaluation of basic research, developments and practical applications of MoS_2 lubricants all over the world. The store of knowledge with regard to molybdenum disulfide lubrication accumulated by Alpha is undoubtedly the largest concentrated at any one place.

Alpha Operations World Wide

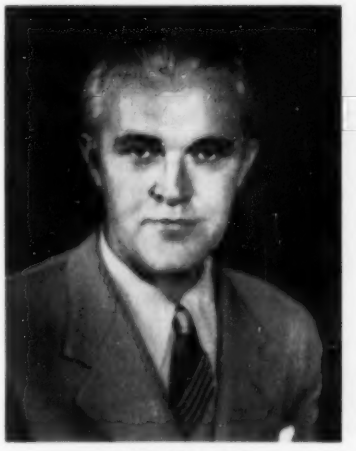
Two production plants process molybdenum disulfide into MOLYKOTE lubricating oils and greases. The domestic needs are served from the company's facilities in Stamford, Connecticut and European manufacture is centered in the company's factory in Munich, Germany. Factories in France and England are being planned.

Testing Machine Division Started

The Alpha Molykote corporation has started a testing machine division which will be exclusively devoted to the development, manufacture and

Continued on page 62

NLGI Company Representative



ALFRED SONNTAG

NLGI Technical Representative

ALFRED LEWIS

PEOPLE in the Industry

Kay Heads Catalyst Development for Climax Molybdenum

Herbert Kay has been named manager—catalyst development for Climax Molybdenum Company, it was announced by Dr. Charles H. Kline, manager of the company's chemical development division. Previously he had been in charge of new chemical development.

In his new position, Mr. Kay will be responsible for the development of uses of molybdenum in corrosion inhibitors, intermetallic compounds and ceramics as well as in catalysts. Although catalysts for petroleum and chemical processes now represent the largest non-metallurgical use of molybdenum, the field is growing so rapidly that Climax is doubling its pure molybdic oxide capacity to meet this demand.

Mr. Kay joined Climax Molybdenum Company about a year ago when the company established its chemical development division. Previously he had been employed for six years by Pittsburgh Consolidation Coal Company. As group leader in the research and development division, he made major contributions to the development and design of a number of new commercial coal conversion processes. Mr. Kay's other industrial experience includes petrochemical process research for Stanolind Oil and Gas Company and development of liquid fuels from coal and oil shale at the Naval Research Laboratory. In the latter assignment, Mr. Kay was an officer in the U. S. Naval Reserve.

Mr. Kay received a B.S. degree in Chemical Engineering from The Pennsylvania State College in 1944 and an M.S. in Chemical Engineering Practice from Massachusetts Institute of Technology in 1947.

Ogburn, Foote Mineral Research Executive Announces Retirement

Dr. S. C. Ogburn, Jr., Vice President, Research and Development, Foote Mineral Company, has announced his retirement effective March 1, 1956. While retiring as an officer of the company, he will continue to serve as a management consultant.

Ogburn joined Foote Mineral in 1948 as Manager of Research and Development, became a member of the board in 1949 and was named vice president in 1951.

A native of Winston-Salem, N. C., Ogburn is a graduate of the University of North Carolina, and received advanced degrees in chemical engineering from that university and from Washington and Lee, where he taught from 1921 to 1926. At Bucknell University, he was head of the Department of Chemical Engineering and Chairman of the Engineering Division before leaving in 1936 to take up industrial research work. Prior to joining Foote Mineral Company, he had served as research manager for both General Chemical Company and Pennsylvania Sale Manufacturing Company.

He is the author of several patents and over 25 technical papers dealing with chemical research and research management. His professional society memberships include American Institute of Chemical Engineers, American Chemical Society, The Electro-Chemical Society and the Industrial Research Institute.

Appointments Announced By E. F. Houghton & Co.

Three new managerial appointments have been announced by E. F. Houghton & Co., manufacturer of oils, chemicals and packings, 303 W. Lehigh Avenue, Philadelphia.

Charles A. Biller has been named Manager, Foreign Sales Department. He was formerly Assistant Manager. He joined the company in 1952.

Armand J. Andre, previously a representative in Houghton's Chicago Sales Division, was named to the newly created position of Assistant Sales Manager of the Southern Division, with headquarters in Charlotte, N. C. Andre has been with Houghton since 1939.

William Eismann, former Supervisor of Lubrication and Rust Preventive Research, was appointed Acting Research Manager, following the resignation of Dr. K. C. Frisch. Eismann joined Houghton in 1937.

CONSTANT

SEARCH for BETTER LUBRICANTS by DENCO

ASSURES QUALITY IN YOUR PACKAGE

The same "Know-How" that makes Denco the first in the manufacture of bentone lubricants, is used in everyday production of Denco's complete line of greases, oils, and compounds for every lubricating and metal-working function. A "Know-How" that's backed by fifty years of experience.

We will produce to your specifications, package, label, and ship according to your instructions.

Call OL. 1-6600 or write today

DENCO PETROLEUM CO.

5115 Denison Ave.

CLEVELAND 2, OHIO

American Potash Appoints Clapper and Curtis

Dr. Thomas W. Clapper has been appointed associate director of Research for American Potash & Chemical Corporation to head research facilities and activities at the company's Henderson, Nev., plant, it was announced by Joseph C. Schumacher, director of Research.

Clapper comes to American Potash & Chemical Corporation from Chemical Construction Company, a subsidiary of American Cyanamid Company, where he was plant manager of the Calera Cobalt refinery at Garfield, Utah. Previously, he had been a research chemist with American Cyanamid, later becoming head of the department producing sulfa drugs. He then was named technical director and, subsequently, general superintendent of the American Cyanamid Atomic Energy project at Idaho Falls, Idaho.

Clapper is an organic chemist, having received his B.A. degree in 1937 from St. Vincent College, Latrobe, Pennsylvania. He received a M.S. degree in 1938 and a Ph.D. in 1942 from Pennsylvania State College, and did postgraduate work at Princeton University in organic chemistry and chemical engineering.

Curtis to Henderson, Nevada

Parker S. Dunn, vice-president, Manufacturing, of American Potash & Chemical Corporation, has announced the appointment of Henry S. Curtiss as plant manager of the company's Henderson, Nev. plant.

Curtis comes to American Potash & Chemical Corporation from Monsanto Chemical Company at Texas City where he was administrative assistant to the head of the Engineering Department. Previously he served as manager of Production and Engineering at Diamond Alkali Company's Agricultural Chemicals Plant at Houston, Tex. Prior to joining Diamond Alkali in 1951, he was production superintendent of Naugatuck Chemical Company, Painesville, Ohio, following service with the Glenn L. Martin Company as plant manager of its Chemicals Division, also at Painesville.

Curtis is a licensed engineer in several states, received his Engineering degree at Ohio State University, and during World War II served in the Chemical Corps of the United States Army attaining the rank of Lt. Colonel.

As Plant Manager, Curtis will be the senior operating executive and will be responsible to Dunn.

The Nevada company produces electrochemicals such as sodium and potassium chlorate, ammonium and potassium perchlorate and manganese dioxide.

American Potash Announces Personnel Changes

A realignment of the Western Sales Department of American Potash & Chemical Corporation has been announced by William M. Clines, Western Sales Manager.

Ralph Hoh, formerly supervisor of soda ash sales, has been named manager of soda ash sales, to handle the

A new addition to the complete line of

G.P.&F. STEEL SHIPPING CONTAINERS

Easy-to-stack

FLAT-TOP

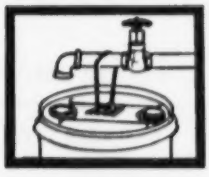
Two-opening

UTILITY CANS

Easy to stack! Easy to ship! Easy to store! And the new G. P. & F. Flat-Top Utility Cans are money-savers, too . . . eliminating the need for reshipping cartons . . . and requiring less space for shipping and storage. G. P. & F. Flat-Tops are available in both 5-gallon and 40-pound gear lubricant sizes . . . with two openings (for pouring and filling). Goose-neck reversible spouts available in long and short styles.

CHOICE OF TWO HANDLES

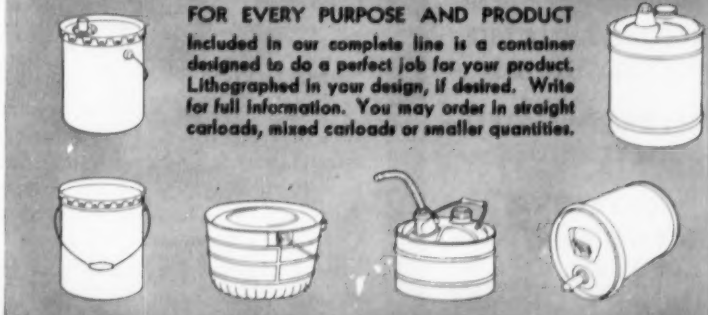
G. P. & F. Flat-Top Utility Cans are available in a choice of standard, center-grip handle . . . or extra-long, center-grip handle for fitting over faucets, as shown at right.



THERE'S A G.P.&F. STEEL CONTAINER

FOR EVERY PURPOSE AND PRODUCT

Included in our complete line is a container designed to do a perfect job for your product. Lithographed in your design, if desired. Write for full information. You may order in straight carloads, mixed carloads or smaller quantities.



GEUDER, PAESCHKE & FREY CO.

425 NORTH 15TH STREET • MILWAUKEE 1, WISCONSIN

Telephone Division 4-3000

company's expanded production of the product.

Trevor Steele, formerly Pacific Northwest regional agronomist for the company, has been transferred to agricultural chemicals sales, reporting to Paul F. Staub, Pacific Northwest district sales manager.

Frank McCrane has been named manager of western potash sales to fill the post previously handled by Rod Taft, recently transferred to San Francisco as district sales manager. McGrane joined the company last September in the Sales Department's general staff.

Daniel A. Lundy will continue in charge of western sales of boron products, lithium products and bromine.

Interstate's Nylander Dies

Robert A. (Bob) Nylander, 40, Treasurer of the Inter-State Oil Co. of Kansas City, Kansas died March 31, 1956 following a brief illness.

Born in Emporia, he moved to Kansas City at four and was a graduate of Westport High and Kansas City Junior College.

ROBERT A. NYLANDER

Mr. Nylander joined Inter-State in December 1944. His progression from the position of Order Desk, to Office Manager, Sales Manager of the Dealer Department, Purchasing Agent and Treasurer of the company, was a tribute to his ability.

Widely known throughout the industry, Mr. Nylander was a member of the Kansas City, Kansas Chamber of Commerce, a director of the Independent Oil Compounders Association and an elder in the Parkville Community Church.

He leaves his wife, Mrs. Bette Louise Nylander, two daughters, Sally Jo Nylander and Janice Marie Nylander, all of the home at 5308 Oak Street, Kansas City, Missouri; his mother, Mrs. Mary Elizabeth Barker and his stepfather, L. R. Barker of Long Beach, California.

Deep Rock Reorganizes Sales Division

Realignment of the sales organization of Deep Rock Oil Company, to consolidate marketing of similar products from Wynnewood and Cushing refineries, has been announced by Deep Rock president F. C. Love.

Sales of certain products from each refinery were handled formerly by separate departments. The new arrangement combines products of the same nature in the same department, regardless of origin.

J. J. Kelly, vice-president in charge of bulk sales, announced that three new sales divisions were created.

Transfer of W. W. Rice from the direct sales department to the new bulk sales department was announced by Kelly. Rice, who has been appointed manager of fuel sales, was formerly manager of industrial sales in the direct sales department.

Other new divisions of the bulk sales department will be headed by Jack H. Mitchell, manager of asphalt sales, and C. C. Batchelor, manager of pipeline sales. Mitchell formerly headed the company's northern asphalt sales and Batchelor was formerly manager of traffic and distributions.

W. M. Murray, vice-president in charge of direct sales, announced appointment of D. R. Frey as manager of the industrial oil sales department, the position left by Rice. Frey has been manager of products application department, heading the research laboratory at the Cushing refinery. He has been transferred to company headquarters in Oklahoma City.

Credit Association Elects Weiler of the Texas Company Vice-President

Richard W. Weiler, assistant treasurer and general credit manager of The Texas Company, has been elected a vice-president of the New York Credit & Financial Management Association. Mr. Weiler was elected at the Association's annual meeting April 5.

The Association is composed of 3,750 member firms in the manufacturing, wholesaling and distributing industries and is the largest affiliate of the National Association of Credit Men.

Bill Purvis Joins Chek-Chart Corp.

The Chek-Chart Corporation of Chicago, publishers of automotive lubrication information, has announced the appointment of Bill Purvis as Account Executive. A graduate of the University of Missouri School of Journalism, Purvis was Advertising Manager of the Battenfeld Grease & Oil Corp., Kansas City, Missouri, prior to his new position. His work in the industry has also included two years with the Standard Oil Company (Indiana) in their St. Joseph, Missouri, division.

DARLING'S

FATTY ACIDS
ESPECIALLY FOR
GREASE MAKERS

STEARIC ACID
OLEIC ACID
RED OIL
HYDROGENATED FATTY ACIDS
HYDROGENATED GLYCERIDES
GLYCERINE
STEARINE PITCH

DARLING & COMPANY
4200 S. ASHLAND AVE.
CHICAGO 9, ILL.

ONE GREASE GUN

Because **INLUCITE 21** is superior to every specialized grease it replaces, its use means greater lubrication protection and customer satisfaction.

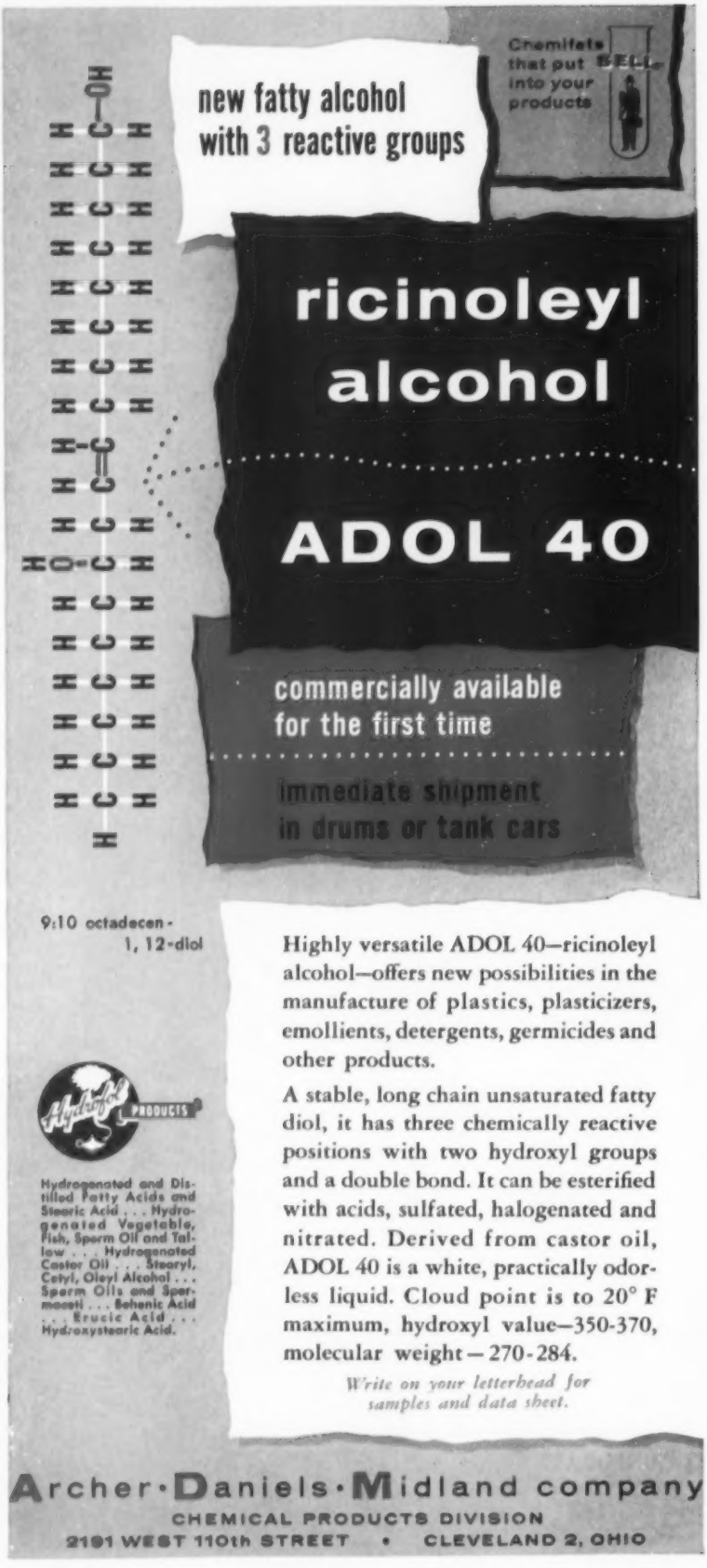
ONE GREASE

INLUCITE 21, unexcelled lithium-base, multi-purpose grease speeds up service, eliminates mistakes, and reduces inventory for service stations.

SERVICE STATION PROFITS UP 85 PER CENT

and total grease jobs jump 39%, reports one major oil company. One grease, one gun, and a better job . . . do you know a sounder way to streamline your operation? For details write INTERNATIONAL LUBRICANT CORPORATION, New Orleans.

With Research Comes Quality, With Quality Comes Leadership


Chemicals that put SELL into your products
new fatty alcohol with 3 reactive groups
ricinoleyl alcohol
ADOL 40
commercially available for the first time
immediate shipment in drums or tank cars
9:10 octadecen-1, 12-diol
Highly versatile ADOL 40—ricinoleyl alcohol—offers new possibilities in the manufacture of plastics, plasticizers, emollients, detergents, germicides and other products.
A stable, long chain unsaturated fatty diol, it has three chemically reactive positions with two hydroxyl groups and a double bond. It can be esterified with acids, sulfated, halogenated and nitrated. Derived from castor oil, ADOL 40 is a white, practically odorless liquid. Cloud point is to 20° F maximum, hydroxyl value—350-370, molecular weight—270-284.
Write on your letterhead for samples and data sheet.
Hydrofol PRODUCTS
Hydrogenated and Distilled Fatty Acids and Stearic Acid . . . Hydrogenated Vegetable, Fish, Sperm Oil and Tallow . . . Hydrogenated Castor Oil . . . Stearyl, Cetyl, Oleyl Alcohol . . . Sperm Oils and Spermaceti . . . Behenic Acid . . . Erucic Acid . . . Hydroxystearic Acid.
Archer·Daniels·Midland company
CHEMICAL PRODUCTS DIVISION
2191 WEST 110th STREET • CLEVELAND 2, OHIO

DuPont's Bertolette Describes New Fuel Stabilizers

Chemical additives can solve the problem of stability in jet fuels, just as they have eliminated the same problem in diesel fuels, furnace oils and residual fuels, it was pointed out by W. deB. Bertolette of the Du Pont Company's Petroleum Chemicals Division.

The paper prepared by Mr. Bertolette and J. D. Rogers, both fuel specialists from Du Pont's Petroleum Laboratory, was presented to the Western Petroleum Refiners Association. It pointed out that increased use of catalytically cracked stocks, for these fuels, has resulted in less fuel stability, but that this stability problem can be met through the use of chemical additives.

Jet fuels of improved thermal stability are urgently needed, the refiners were told. Mr. Bertolette said the stability problem in jet fuels results from jets being subjected to high temperatures at sonic and supersonic speeds. At these temperatures, he said, air cooling of the lubricating oil is impractical and the best coolant is the fuel. But the use of fuel as a coolant poses new problems because of the thermal stability of jet fuels which, like other petroleum fuels, form gums and residues when subjected to abnormally high temperatures. The residues plug fine openings and orifices of fuel nozzles and control equipment through which heated fuel is pumped. Then too, there is the problem of lacquer and soluble gum deposits.

The speaker said the aircraft involved in this problem include the new Century series of fighters as well as high altitude bombers.

Additives can improve the thermal stability of most jet fuels but, where the problem is quite severe, the combination of fuel treating plus an additive may be needed. Polymeric dispersant additives, which do not change the chemical characteristics of deposits and which give them improved filterability, have been effective in jet fuels, as well as in diesel fuels, Mr. Bertolette said.

Insoluble residues and soluble gums result from the use of catalytically

cracked stocks for home furnace and diesel oils, clogging filters, screens, and nozzles. The speaker pointed out that these problems are practically the same in diesels and home furnaces.

An entirely different phase of plugging in home burners is the formation of gels, it was stated. These gels are caused in many cases by a reaction between soluble copper from either copper or brass metal parts and the mercaptans present in the fuel oil to form copper mercaptides which may either precipitate out as a wax coating or form a jelly-like deposit. He said, however, that the use of small amounts of metal deactivators will prevent the formation of this gel.

Residual fuels which came in for some discussion in the Du Pont paper are used principally in diesels, boilers and large gas turbines. The problem outlined here was that the end uses of residual oil all share the common problem of sludging associated with the storage and handling of this type fuel.

Field tests with a dispersant additive in residual fuel burner systems at three different chemical manufacturing plants showed benefits in the removal of sludge from storage tanks, prevention of strainer clogging, and prevention of flameouts due to water settling during intermittent operation, Mr. Bertolette said.

The Du Pont paper was illustrated with slides showing charts and graphs, diesel filters with and without an additive, photo-micrographs of fuels stored with dispersant type additives, the results of the use of metal deactivator to prevent gel formation, filters and screens from domestic burners using fuels treated with an additive and untreated fuels, and deposits on domestic burner nozzles.

Divorcement of Marketing Held Peril to Independents By Shell Oil Executive

J. G. Jordan, Shell Oil Company's marketing vice-president, warned that divorcement of marketing from other operations of integrated companies would threaten the existence of independent marketers and at the same time weaken the entire industry.

Addressing the Illinois Jobbers Association, Mr. Jordan said that a well-integrated process is best equipped to insure the continued healthy development of all phases of the oil industry.

"I do not see how divorcement can help anybody in the oil industry or any customer of the industry," the Shell executive declared.

"I can see how it might hurt many. There are reasons to believe it would mean the end of many jobbers and dealers. It could lead to poorer service to the public."

Proposed by Minority

Mr. Jordan told the jobbers that divorcement "seems to be proposed by only small minorities, and we know that many independent marketers are strongly opposed to divorcement."

Mr. Jordan foresaw the appearance of national or regional marketing companies as what he termed "one logical consequence of divorcement."

"Would these new big regional—or national—marketers have room for middlemen in their setups—or, because of their more compact operations, would they find direct marketing more economical?" the Shell vice-president asked.

"Would there be a trend toward more company operation, for similar economic reasons? Would this trend leave less and less room for the independent dealer?"

Another possibility, Mr. Jordan said, would be the appearance "of what we might call terminal marketers. These would be smaller than the regional or national outfits but far larger than most jobbers now in business—big enough to take over the integrated companies' high investment in terminal facilities."

Among the questions raised by the Shell executive in discussing the effects of terminal marketing were the future of credit cards, of brand names, the possibilities of direct operations by terminal marketers, and the great financial problem involved in disposing of properties beyond the terminal.

"Let's not forget that the effects of divorcement won't stop with jobbers, dealers and the integrated companies themselves," Mr. Jordan said. "They will also touch on the lives of many others—customers, property owners, stockholders and thousands of people now employed in petroleum marketing."

Mr. Jordan also painted a picture of what divorcement would mean to the national security.

"In time of emergency, the government must be able to get enormous volumes of product on short notice at widely separated points. Integrated companies are well-equipped to meet such needs. It is hard to see how adequate supplies of fuels, lubricants and other products could be provided as efficiently by an industry that had been dismembered," he asserted.

"This industry's progress toward better fuels, better lubricants, better service, and better transportation has been built on a broad and very costly foundation of scientific research. I wonder how this would be done if the industry were cut up," he said.

Mr. Jordan praised free markets, the law of supply and demand, and competition for giving the American economy its vigor.

"I am an optimist," he said. "I believe this country is going to keep on growing. I believe this industry of ours is going to grow with it. We have operated for years in an atmosphere of freedom, with thousands of companies of all sorts and sizes maintaining the kind of healthy, dynamic balance that competition can provide. We can go on this way, and grow in service to the nation as we grow in efficiency and strength."

1956 Guide to Approved Lubrication for Passenger Cars and Light Trucks

The 1956 Guide to Approved Lubrication for Passenger Cars and Light Trucks has just been published by The Chek-Chart Corporation of Chicago. Among the 160 pages of lubrication charts, service instructions and tabular data, the new edition introduces two tabular pages of lubricant recommendations for the most popular European Passenger Cars in use today.

In the expected full coverage, all 1956 model requirements are present-

ed with service data for older models, revised to reflect any changes manufacturers have made in their lubricant and service specifications. The most popular light trucks are incorporated as well, with further special service instructions and marketing pages related to lubrication and accessories.

The top guide in its field, there is more than enough information contained in this one volume to meet any lubrication service needs that may be brought to the service station operator.

For additional information and prices, contact The Chek-Chart Corporation, Sales Department, 33 East Congress Parkway, Chicago 5.

Foote Mineral-Electro Manganese Exchange Completed

Foote Mineral Company announced that the exchange of 169,178 of its shares for the assets and business of Electro Manganese Corporation has been completed.

The operations of Electro Manganese in Knoxville will be handled as a division of Foote starting as of March 17, 1956.

Almost everything that moves either in actual operation or in the process of its making . . . from gate hinges to tractor wheels . . . depends upon grease. That is why lubricants should be bought with care. You can always depend upon Deep Rock highest quality greases and lubricants. They are manufactured to give top lubrication to all moving parts.

DEEP ROCK OIL COMPANY
386 N. Robinson
Oklahoma City, Okla.
DEEP ROCK

Monsanto Readies Employes' Stock Plan

The 1956 Employes' Stock Plan for approximately 18,400 hourly and salaried employes of Monsanto Chemical Company and its domestic subsidiaries —and for its associated companies, if permitted by both parent companies— has been submitted to shareowners in a proxy statement mailed recently.

If approved by shareowners at their annual meeting April 12, the plan will offer eligible employes three-year stock options on a maximum of 400,000 shares of common stock. The plan would become effective on a date later this year to be fixed by the Board of Directors and would terminate on Sept. 30, 1959. On the effective date, each eligible employe would be granted an option to purchase a number of shares, which at the purchase price, would equal up to 30 per cent of his base pay at that time computed on an annual basis. Purchase price would be 95 per cent of the average selling price of the stock on the effective date. Employes would have 40 days from the effective date to decide on participation.

Through monthly payroll deductions, employes taking part in the plan would build a fund toward the purchase of optioned stock. Interest of three and one-half per cent per annum would be credited to each employe's stock account on December 31 each year. During the months of September, 1957; March, 1958; September, 1958; March, 1959; and September, 1959, each employe would be able to exercise his option for not more than the number of shares of stock which could be purchased at the option price by the credit balance then in his option account.

Members of the Board of Directors believe that the new plan will increase proprietary interest in the company on the part of the employe as well as encourage systematic savings.

It is contemplated that eligible employes will include all regular full-time hourly-paid and salaried persons in the employ of the company on the effective date. Directors and officers of the company, with the exception of assistant controllers, assistant secretaries and assistant treasurers, are excluded. Also excluded are employes who have passed their 62nd birthdays before the effective date of the plan and employes who, on the effective date, hold options under the company's Stock Option Plan approved by shareowners in 1951.

Participation in the plan will not bind employes to exercise their options and employes may reduce the amount of payroll deductions or withdraw all or any part of their credit balances, or both.

U. S. Steel Expands In Middle West

United States Steel Corporation recently announced details of its replacement, modernization and expansion program for corporation plants in Indiana and South Chicago, Ill.

U. S. Steel has plans to increase the annual steel-making capacity of its Gary Steel Works by more than 700,000 tons, through improvements of existing open hearth furnaces, and similarly to increase the capacity of its South Works at South Chicago by more than 500,000 tons. The prospective improvements are designed to lift the capacity of the Gary Works, largest in the world, to almost 8,000,000 (M) tons a year and that of South Works to almost 6,000,000 (M).

Public announcement of these projects and of plans to install new facilities for rolling and treating steel was made by Roger M. Blough, Board Chairman of U. S. Steel, at a civic banquet commemorating the 50th anniversary of the start of construction of Gary Steel Works. Earlier in the day, Clifford F. Hood, U. S. Steel President, made a similar report to the supervisory staffs of the corporation plants in the Gary area.

In addition to enlarging the capacity of its open hearth furnaces in the Chicago District, U. S. Steel has plans to improve the 44-inch slabbing mills at both Gary and South Works, and thus increase capacity for rolling ingots into semi-finished form, Mr. Blough said.

U. S. Steel's program for the Chicago District also contemplates the installation of new production facilities at the Gary Sheet & Tin Mill. Mr. Blough said these would include: a new hot strip mill, for rolling slabs into strip; a new pickle line, for removing surface oxides from hot-rolled strip; a new cold mill, for reducing the thickness and improving the quality of steel sheet; new batch annealing

Before you buy

LITHIUM HYDROXIDE

Research the Source

Four factors make Lithium Corporation your best source of supply:

1. ***COMPANY-OWNED ORE DEPOSITS AND CONCENTRATION FACILITIES.***
   Lithium Corporation's position with respect to raw ore reserves is second to none.
2. ***COMPLETE CHEMICAL PROCESSING AND ELECTROMETALLURGICAL PLANTS.***
   Indicative of future planning in terms of meeting the world's needs for lithium is the company's new $7,000,000 chemical plant which went on stream this year.
3. ***RESEARCH AND PRODUCT DEVELOPMENT FACILITIES.***
   A newly formed Department of Product Research and Development has been created to develop new uses and markets for lithium compounds.
4. ***EXCLUSIVE ATTENTION TO LITHIUM.***
   Lithium Corporation has developed lithium into more forms for more commercial uses than any other processor in the field. Available now, experimentally or commercially, are six salts, seven forms of metal, and nine special compounds.

To be sure . . . research the source.

. . . trends ahead in industrial applications for lithium

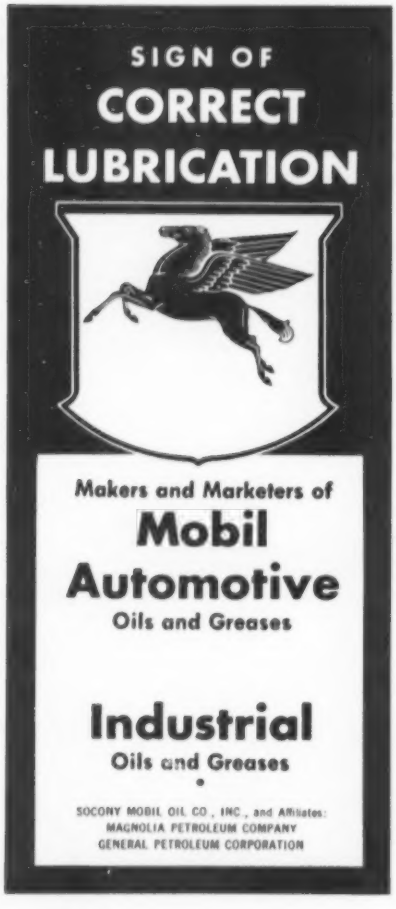
LCA **LITHIUM CORPORATION OF AMERICA, INC.**
2575 RAND TOWER
MINNEAPOLIS 2, MINN.

MINES: Keystone, Custer, Hill City, South Dakota • Bessemer City, North Carolina • Cat Lake, Manitoba • Amos Area, Quebec • BRANCH SALES OFFICES: New York Pittsburgh • Chicago • CHEMICAL PLANTS: St. Louis Park, Minnesota • Bessemer City, North Carolina • RESEARCH LABORATORY: St. Louis Park, Minnesota

furnaces, for removal of stresses created in cold-rolling; new temper mills, which impart a controlled stiffness to sheet; a new line for recoiling sheet after it emerges from temper mills; and a new flying shear line, for cutting sheets of specified sizes.

Mr. Blough said this program was pointed toward increased production of flat-rolled products, notably sheets. He added that the new program is a further "investment in employment" that will create more jobs in U. S. Steel's Chicago District plants.

The Board Chairman of U. S. Steel said the corporation had also developed plans for a new mill at South Works for the rolling of structural sections, such as the light-weight, wide-flanged beams much needed in the construction industry; and plans for additional sintering facilities at both Gary Steel Works and the plant at South Chicago, for agglomerating blast furnace materials for their more efficient use.



Late in 1955, U. S. Steel announced that its continuing planning of replacements, modernization and expansion contemplated a corporation-wide increase in its steel-making capacity of approximately 2,500,000 (M) tons. That capacity is now more than 39,000,000 (M) tons.

New Plant in Indiana

Construction of a new 3,000,000 (M) barrel per year plant of Universal Atlas Cement Co., a U. S. Steel subsidiary, is well under way at nearby Buffington, Ind. Mr. Blough said that Universal Atlas hoped the new plant would be in operation by the end of 1956, but that the completion date depended on deliveries of equipment. When the new plant is completed, Universal Atlas will have a total annual capacity of almost 10,000,000 (M) barrels at Buffington.

The Board of Directors of U. S. Steel and the Corporation's principal officers have inspected Gary Steel Works, the Sheet & Tin Mill, the Universal Atlas facilities, and the Gary plants of U. S. Steel's American Bridge and National Tube divisions. The same group will visit South Works, and the Board of Directors will hold a special meeting in Chicago.

Chek-Chart Publishes New Lubricant Reference

The new edition of The Motor Oil and Gear Lubricant Recommendations Wall Chart, published by The Chek-Chart Corporation of Chicago, again provides a convenient reference for vehicle services. Lubricant type and grade, plus capacity, for crankcase, transmission and differential, in addition to cooling system and gas tank capacities, are given finger-tip treatment for passenger cars. All passenger cars, including popular European models, trucks, farm tractors, school buses and motor coaches, motorcycles and outboard motors are included. Staggerfold binding and a new color system of reference tabs at the bottom on the pages make it easy for every man working with the noted vehicles to find needed information quickly.

At the same time, the new edition of The Motor Oil and Gear Lubricant Recommendations Booklet has also been released to the industry. In its coverage of passenger cars, trucks and farm tractors, it not only has the advantage of being pocket sized but also provides crankcase and gear unit capacity for trucks and farm tractors together with the lubricant type and grade information of the larger publication. Noteworthy additional data in the Booklet is the comprehensive listing of farm tractor cooling system capacities.

Further information concerning either publication may be received from The Chek-Chart Corporation, Sales Department, 33 East Congress Parkway, Chicago 5.

Climax Molybdenum to Double Pure Molybdic Oxide Capacity

Climax Molybdenum Company's pure molybdic oxide capacity, currently 2,700,000 pounds a year, will be doubled by the installation of a second sublimation furnace at its Langeloth, Penna., plant, it has been announced by E. S. Wheeler, vice-president and general manager of the Climax Molybdenum Company of Pennsylvania subsidiary.

Construction will begin immediately, with early September as the expected date of completion. Rust Engineering Company, Pittsburgh, Penna., is the contractor.

Reason for the expansion is the increase in demand for applications requiring molybdic oxide of high purity —principally catalysts and molybdenum metal for powder metallurgy and super-alloys. As a result of continued growth of these markets, sales of pure oxide increased 50 per cent last year, capping a three-year increase of almost 300 per cent.

Molybdenum catalysts are finding increasing acceptance, particularly in petroleum reforming and desulfurization processes, because of their exceptional resistance to poisoning by sulfur and other contaminants, high catalytic activity and economy of use. Total world consumption of molybdic oxide for catalysts in 1955 is estimated at about 1,800,000 pounds, as compared with an estimated consumption of about 300,000 pounds in 1952.

In addition to these refining processes for upgrading petroleum products, molybdenum catalysts are widely used in the manufacture of chemicals. Among commercial processes using molybdenum catalysts are the oxidation of methanol to formaldehyde,

the oxidation of benzene to maleic anhydride and the chlorination of aromatic compounds.

Sales of pure molybdic oxide to sintered metal producers also have been increasing, largely to satisfy the demand for molybdenum wire and strip in lamps, electronic tubes and electrical contacts. Large quantities of pure molybdic oxide are also required for corrosion- and heat-resistant alloys. Recent advances in the field of super-alloys, which have outstanding resistance to corrosion and high temperatures, hold promise of greater growth in 1956.

Process Details

The Climax plant at Langeloth converts molybdenite concentrates (MoS_2), which it receives from the Climax, Colorado mine and mill, into a number of products for the metallurgical and chemical field, of which the pure oxide is one. First step in the conversion is roasting of the molybdenite concentrate to technical molybdic oxide (MoO_3) in a Nichols-Herreshoff furnace.

Since molybdic oxide volatizers above 1100°F, the pure oxide is produced by sublimation. Technical molybdic oxide is fed into a Globar-heated rotary-hearth furnace at about 2000°F-2150°F. The oxide vaporizes and the sublimed MoO_3 is swept out of the furnace into bag filters where the pure oxide is collected.

The product, an exceedingly fine, light material averaging over 99.5 per cent MoO_3, is then densified before packaging. In this operation, the material's density is increased about seven times, by "pugging" with a minimum amount of distilled water, followed by drying and milling.

Nopco's 1955 Sales and Earnings Set Record High

Both the sales and earnings of the Nopco Chemical Company in 1955 were the highest in the history of the company.

Earnings of $3.05 per share on the 492,238 shares of Nopco stock surpassed the 1954 record of $2.66 per share of 484,238 shares by 14.7 per cent. Net sales exceeded the 1954 figure by $2,380,000 or 11.5 per cent.

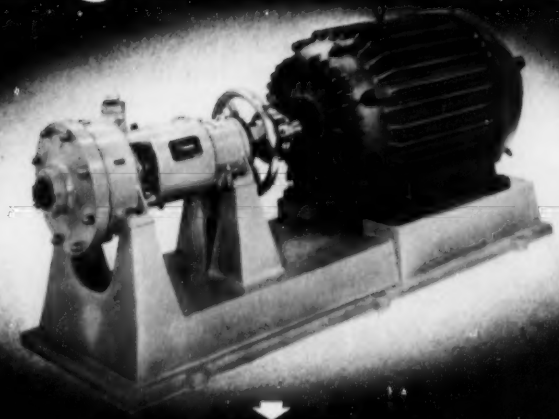
These facts were revealed in the Annual Report to Nopco stockholders which has just been released. The report also pointed the rise in the common stock dividend rate over the previous year. During 1955, Nopco raised its regular common stock dividend from 30c quarterly in 1954 to 35c quarterly in March and June, and then to 40c in the September and December quarters. In November an extra dividend of 25c was declared, payable in January 1956. Dividends of $4 per share were declared and paid during the year on the Preferred Stock outstanding.

Founded in 1907, Nopco is a leading producer of synthetic organic chemicals, industrial processing specialties, foamed plastics and vitamin products for a wide range of industries. It has plants in Harrison, N. J.; Richmond, Calif.; Cedartown, Ga., and London, Ont., Canada.

Baker Castor Oil Issues Listing of Pilot Plant Products

According to a supplementary catalog recently released, The Baker Castor Oil Co. is now manufacturing on a pilot plant level more than 40 new products stemming from its continuing research program using castor oil as the basic raw material. Largely unique in chemical structure, and meriting consideration in many industrial

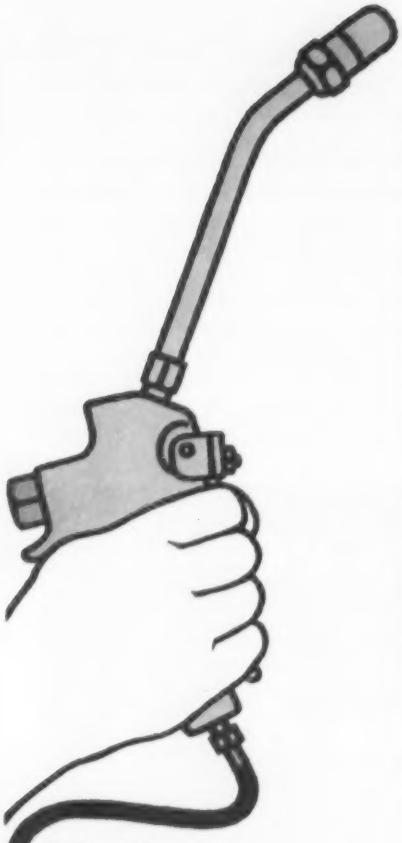
all eyes are on the
CHARLOTTE
for grease milling



ELIMINATES AERATION
EFFICIENT — ECONOMICAL OPERATION
LOW MAINTENANCE
TOP CAPACITY — UNIFORM QUALITY

for detailed information call or write-

CHEMICOLLOID
LABORATORIES, INC.
55 Herrick Road · Garden City Park, L. I.



laboratory
engineered
for your
protection

PENOLA AUTOMOTIVE LUBRICANTS

GREASES,
CUTTING OILS

are quality controlled
for dependable performance
in every lubricating job.

Penola

PENOLA OIL COMPANY
15 West 51st St., New York 19, N. Y.

applications, the new items are an addition to the more than 85 regularly manufactured products described in Baker's "Catalog of Castor Oils and Chemical Derivatives" issued last year.

Although application information is still limited, the Baker laboratories are now engaged in a program to develop potential uses for the new derivatives, and are offering experimental samples to interested concerns for collaborative evaluation. Properties and suggested applications of these new products are listed in the "Catalog of Pilot Plant Products," copy of which may be had by writing The Baker Castor Oil Co., Sales Promotion Dept., 120 Broadway, New York 5, N. Y.

American Society for Testing Materials Sets Sights on Nuclear Problems

Standards for materials and for testing of materials used in nuclear energy development, particularly in the construction of reactors, will receive special attention by the American Society for Testing Materials. A Special Administrative Committee on Nuclear Problems has been organized by the Society. Its scope is (1) to advise the technical committees of the Society on nuclear problems pertinent to their respective scopes, (2) to stimulate the undertaking of research and standardization projects, specifically related to nuclear energy, on the part of the technical committees, and (3) to review periodically the status of the work.

As a first step in coordination, ASTM Committee E-10 on Radioactive Isotopes will be asked to expand its title and scope to investigate, promote, and advise on techniques and standards for measuring changes in properties and constitution of materials as a function of radiation exposure. The Special Administrative Committee agreed that basic procedures for specimen prepartion, exposure to radiation, and special techniques for measuring properties after exposure could be developed by Committee E-10.

The Atomic Industrial Forum and ASTM will sponsor jointly a symposium on radiation effects on materials at the ASTM Pacific Area National Meeting in Los Angeles, September 17-21, 1956. Additional papers sponsored by Committee E-10 concerning radiation effects and radioisotope uses will be included in a companion symposium.

In advancing its work, the Special Administrative Committee will establish a list of materials used in reactors as a basis for future technical committee activities. Information will be obtained from the technical committees on current and planned activities regarding engineering materials in clear reactors (including nuclear fuels) as well as the property changes in engineering materials exposed to nuclear radiation.

The appointment of the Special Administrative Committee is an outgrowth of a conference called by ASTM President C. H. Fellows, Detroit Edison Co., November 11, 1955, at New York to consider the demand for standards on materials employed in nuclear energy development and the need for information on radiation effects on materials.

Present were leading authorities in the fields of metals, rubber, plastics, water, and other materials, and representatives of users, operators, and other groups directly concerned. F. C. Robinson, Chief, Reactor Development Branch, Atomic Energy Commission, contributed in considerable measure to a better understanding of some of the problems. A letter from Chairman Strauss of the AEC subsequent to the meeting expressed his pleasure at hearing of the activity.

The conferees unanimously agreed that the technical committees of the American Society for Testing Materials should be alerted to consider immediately the need for standards in their areas and to determine whether sufficient data are available on which to base sound recommendations. The conference also advocated the prompt formation of a small group of experts to constitute a coordinating or advisory committee on the subject.

Mallinckrodt Elects Three New Directors

At their annual meeting April 5, stockholders of Mallinckrodt Chemical Works, St. Louis, elected three new members to the board of directors. They are Dr. Shields Warren of Boston, and Mr. William D. Barry and Mr. Harold E. Thayer, vice presidents of the company.

Stockholders also re-elected the

A Clean Sweep?

It's the best she can do with such simple equipment. But for real cleanliness *"clean as a Metasap stearate"* would be a far more accurate description—as so many grease-makers are finding out to their profit!

Metasap Stearates help you produce greases that flow freely in arctic cold, hold a high drop point in the tropics—and withstand extreme moisture without emulsification. And all at a saving for you!

Many types of stearates and many modifications of each for your most exacting needs, are yours from Metasap—along with comprehensive technical advice from the most experienced stearate team in America. Please write for full information.

Greases that go anywhere ...do anything

These Metasap grease bases are all uniform—you can depend on them to give your specialty grease exactly the qualities you want:

METASAP 598: High gel type for use where high yields are most important.

METASAP 537: Produces a high gel for clear, transparent greases with good lubricating stability.

METASAP GM: Gives a medium heavy gel where smoothness is most important.

METAVIS 540: Can be used with wide range of mineral oils; produces semi-fluid, adhesive-type lubricant known as castor machine oil. Highly economical.

METASAP CHEMICAL COMPANY

METASAP CHEMICAL COMPANY

HARRISON, NEW JERSEY • Chicago, Ill. • Boston, Mass.
Cedartown, Ga. • Richmond, Calif. • London, Canada

A NOPCO Subsidiary

the cleanest stearates made

present board of directors with the exception of Mr. John M. Meyer, Jr., who having assumed additional duties as senior vice president of J. P. Morgan & Co., Inc., resigned in January 1956.

Dr. Warren, a graduate of Boston University and the Harvard Medical School has been for many years Professor of Pathology at Harvard and Pathologist at New England Deaconess Hospital, Boston. From 1947 to 1952 he was Director of the Division of Biology and Medicine of the Atomic Energy Commission. From 1952 to date he has served as vice-chairman of the Advisory Committee on Biology and Medicine of the Atomic Energy Commission. In February, 1956, he was appointed by the State Department as the United States Representative on the United Nations Scientific Committee on Radiation Effects.

Mr. Barry has been with Mallinckrodt since 1908 and has been in charge of the operation of the company's eastern division for many years. He was elected vice president in 1945.

As head of Mallinckrodt's Atomic Energy Commission program, Mr. Thayer directs the uranium processing operation which will include the new Weldon Spring Plant. Thayer is a graduate of Massachusetts Institute of Technology and joined Mallinckrodt in 1939. He has been a vice president of the company since 1950.

HARSHAW LEAD BASE

Harshaw Lead Base, as an additive to petroleum lubricants, improves extreme pressure characteristics and imparts the following desirable properties:

- Increased film strength
- Increased lubricity
- Improved wetting of metal surfaces
- A strong bond between lubricant and metal surfaces
- Resistance to welding of metals at high temperatures
- Moisture resistance and inhibits corrosion

Harshaw Lead Bases are offered in three concentrations to suit your particular needs:

Liquid 30% Pb	Liquid 33% Pb	Solid 36% Pb

Other metallic soaps made to your specifications. Our Technical Staffs are available to help you adapt these products to your specific needs.

THE HARSHAW CHEMICAL CO.
1945 E. 97th Street • Cleveland 6, Ohio
Branches in Principal Cities

Deep Rock Lubricants Offer Bond-backed Protection

All across the Midwest, motorists will begin receiving official-looking documents with their oil changes. These documents are warranties giving car owners bond-backed protection on their car's lubrication operation so long as they use the type of motor oil specified.

The program, which will put warranty papers in thousands of glove compartments from Texas to Wisconsin, is called Engin.surance (the little dot between the "n" and the "s" threatens to be the bane of newspaper back shops everywhere). It was originated by the Deep Rock Oil Company, marketing arm of Kerr-McGee Oil Industries, Inc., to back up its top grade of motor oil with a $1,000,000 performance bond.

Company officials believe this is the first time in the history of the highly competitive motor lubricant business that users of motor oil have been able to receive absolute product protection. The bond warrants car owners using Deep Rock Special all-season oil against the full amount of any engine damage, repairs or parts replacement directly resulting from product defects.

The Engin.surance program was announced to Deep Rock jobbers and dealers at a series of special meetings in nine cities in the Midwest by Frank C. Love, president of Deep Rock. Love said, "Today's consumer buys motor oil 'blind.' He can't see it in use; he seldom even touches the container.

"For some time we have recognized that an actual guarantee of product performance was needed, in fairness to the consumer and to the service station handling lubricating oils.

"The $1,000,000 Engin.surance bond is positive proof to our customers and dealers of our confidence in the superior quality of new Deep Rock Special all-season motor oil. Development of this guaranteed oil is an indication of the calibre of our technical personnel and the excellence of our production facilities."

At the special meetings, Love also revealed new plans for Deep Rock service station styling. Station colors will change from yellow to white with yellow and blue trim.

All costs of the $1,000,000 Engin.surance bond are paid entirely by Deep Rock. When a car owner has his car registered for the Engin.surance program at his Deep Rock station, he receives a personal warranty made out in his name and backed by the $1,000,000 bond. Each time the car owner buys oil, the purchase is recorded on the back of his warranty. Protection remains in force so long as the car owner continues to use Deep Rock Special all-season motor oil.

To identify the vehicle as being included in the Engin.surance program, the service station attendant attaches a tag to the oil dipstick of the engine. This tag reminds service men of the Warranty and cautions against the use of any motor oil other than Deep Rock Special. As further reminder and identification, a sticker is attached to the car's windshield.

Trucks and tractors also qualify for Deep Rock's Engin.surance protection when Deep Rock motor oil is used according to the program.

All Deep Rock service stations are now equipped to start the Engin.surance program, which will be announced to the public in the most extensive advertising campaign in Kerr-McGee's history.

Chek-Chart Offers New Guides

"Servicing Automatic Transmissions," a 16-page brochure, has recently been published by The Chek-Chart Corporation of Chicago. Its design will enable service stationmen to give complete and accurate automatic transmission service for all of the various types now in use. Both early and late models, including 1956 units, are covered, with line drawings illustrating the steps necessary to perform service. There is an explanation of each type transmission, how it operates, and full, comprehensive how instructions; a table of approximate refill capacities; a table giving dipstick and fill pipe locations and a list of sug-

We like to keep YOUR products "on the beam"

Over the past fifty years of specializing in the production and application of white oils, petrolatums and petroleum sulfonates, it is only natural that we should find many ways that industries can use our products to make *their* products better.

Take, for example, our development of white oils fortified with Vitamin E to assure outstanding stability against odor and color development. Through the use of this Sonneborn improvement, pharmaceutical and cosmetic manufacturers, to name just two industries, give their products longer shelf life and greater saleability.

While our regular line contains many different types and grades of white oils, petrolatums and sulfonates, we specialize in tailor-making these products to fit precise needs. No matter what your problem may be, if it relates to a white oil, a petrolatum or a sulfonate—chances are we can supply a product that's exactly right for you . . . a product that will help keep *your* product "on the beam."

A Product of **Sonneborn** RESEARCH

L. SONNEBORN SONS, INC. • NEW YORK 10, N. Y.

White Oil, Petrolatum & Sulfonate Div.
L. SONNEBORN SONS, INC., Dept. NS
300 Fourth Avenue, New York 10, N. Y.

Gentlemen:

Will you please send me Technical Data on the following:

- ☐ "General Information on White Mineral Oils" I. R. Bulletin "A"
- ☐ "General Information on Petrolatums" I. R. Bulletin "B"
- ☐ "General Information on Petroleum Sulfonates" I. R. Bulletin "G"

What can you do to help me solve this problem?

_____

_____

_____

Name.....

Company.....

Address.....

City.....Zone.....State.....

gested tools and equipment necessary for proper servicing of these units.

The Corporation also announces a new publication, the European Passenger Car Guide. Using the same format and size charts employed in the popular Automotive Lubrication Guide, ten charts give lubrication recommendations and instructions for those European Passenger Cars most frequently encountered. With the increasing popularity of these imported models, it is more important than ever that service stationmen have manufacturer-approved servicing instructions so that proud owners will have confidence in their ability to work on these prestige cars.

Further information may be secured from The Chek-Chart Corporation, Sales Department, 33 East Congress Parkway, Chicago 5.

New Products List Issued by Acheson Colloids

A fifth revision of the four-page booklet, "A List of 'dag' Dispersions for Industry," listing 41 colloidal and semi-colloidal dispersions for operational functions, maintenance, lubrication, machine design, and other industrial applications, has just been issued by Acheson Colloids Co. These products include dispersions of graphite, molybdenum disulfide, mica, vermiculite, zinc oxide, and acetylene black. Carriers and diluents are given for each product, along with typical applications and important physical data.

New on the list is an improved 'dag' Dispersion No. 213, an alkyd-resin product containing semi - colloidal graphite which forms a durable corrosion-resistant dry lubricating film.

Copies of "A List of 'dag' Dispersions for Industry" are available free of charge and may be obtained by writing to Acheson Colloids Company, Division of Acheson Industries, Inc., Port Huron, Michigan.

FISKE BROTHERS REFINING CO.

Established 1870

★

NEWARK, N. J.

TOLEDO, OHIO

★

Manufacturers of

LUBRICATING GREASES

Bulletin on Molybdenum Carbides and Nitrides Published

A six-page bulletin summarizing applications; physical, chemical and mechanical properties; and preparation of molybdenum carbides and nitrides has just been published by Climax Molybdenum Company, Dept. L, 500 Fifth Avenue, New York 36, N. Y., and is available on request.

Designated Bulletin Cdb-7, "Refractory Molybdenum Carbides and Nitrides" covers two molybdenum carbides, Mo_2C and MoC, and the two molybdenum nitrides, Mo_2N and MoN. There is also a section on multicarbide systems, of which the TiC-Mo_2C system appears to be of greatest potential industrial importance.

These refractory materials have been used or appear to have potential value in cutting tools, thermocouple protection tubes, contacts in circuit breakers and such hard-surfacing applications as shot-blasting nozzles, bearing surfaces and die facings. Small amounts of Mo_2C are sometimes incorporated in TiC to remove free carbon and oxygen, and are also used to accelerate formation of solid solutions of carbides.

Molybdenum carbides can be produced by carburizing pure molybdenum powder with carbon black or by various vapor phase reactions.

There are 27 references to sources of more detailed information.

Foote Now Offers Lithium Metal

Lithium metal is now available in commercial quantities from Foote Mineral Company's new metal cell located at their Exton, Pa., plant. The metal is offered in one pound ingots packed under oil in sealed steel cans and typically analyzes 99.8% Li.

While the Company is not currently in commercial production on lithium metal derivatives, development size quantities of a number of derivaties is expected in the near future.

Lithium metal is used principally in organic synthesis for reactions of the Grignard type. It is employed in the synthesis of vitamin A and is used in anti-histamine production. In the metallurgical field, it is used as an alloy for non-ferrous metals, and as a scavenger and degassifier in both the ferrous and non-ferrous fields.

One of the more promising new developments which has excited recent interest is the use of lithium metal as a catalyst in the production of synthetic rubber, having properties and structure identical with natural rubber.

McGEAN 30% LEAD NAPHTHENATE ADDITIVE

Consistently uniform in metallic content and viscosity

Fully clarified by filtration

Non-Oxidizing - - - contains no unsaturated soaps

Free from low flash constituents

your inquiries solicited

THE McGEAN CHEMICAL COMPANY

MIDLAND BUILDING • CLEVELAND 15, OHIO

Detroit • Grand Rapids • Chicago

FUTURE MEETINGS of the Industry

MAY, 1956

13-15 Empire State Petroleum Association, Statler Hotel, Buffalo, N. Y.

13-15 Pennsylvania Petroleum Association, Bedford Springs Hotel, Bedford, Pa.

14-17 American Petroleum Institute (Division of Refining, 21st midyear meeting), Sheraton Mount Royal Hotel, Montreal, Canada.

21-23 American Petroleum Institute (Division of Marketing, midyear meeting), Atlanta Biltmore, Atlanta, Ga.

23-26 American Petroleum Institute (Division of Marketing, Lubrication Committee), Broadmoor, Colorado Springs, Colo.

JUNE, 1956

3-8 SAE Summer meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

4-8 National Fire Protection Assn. (60th annual meeting), Statler Hotel, Boston, Mass.

12-13 Petroleum Packaging Committee, Statler Hotel, Boston, Massachusetts.

17-22 ASTM 59th Annual Meeting and 12th Apparatus Exhibit, Chalfonte-Haddon Hall, Atlantic City, N. J.

21-22 Western Petroleum Refiners Association (regional meeting), Broadview Hotel, Wichita, Kansas.

25-29 American Institute of Electrical Engrs. (1956 Summer & Pacific general), San Francisco, Calif.

SEPTEMBER, 1956

7-8 Desk & Derrick Club, New Orleans, La.

12-14 National Petroleum Association (annual meeting), Traymore Hotel, Atlantic City, N. J.

13-14 Petroleum Packaging Committee, Chicago, Illinois.

16-21 American Chemical Society (130th annual meeting), Atlantic City, N. J.

16-22 ASTM 2nd Pacific Area National Meeting and Apparatus Exhibit, Hotel Statler, Los Angeles, Calif.

19-21 National Industrial Conference Board (marketing meeting) Waldorf-Astoria Hotel, New York, N. Y.

20-21 Mid-Continent Oil & Gas Assn. (membership meeting La.-Ark. Division), Roosevelt Hotel, New Orleans, La.

24-25 IOCA Ninth Annual Meeting, Bismarck Hotel, Chicago, Ill.

OCTOBER, 1956

1-3 Texas Mid-Continent Oil & Gas Association (annual meeting), Rice Hotel, Houston, Texas.

1-5 American Institute of Electrical Engrs. (1956 Fall general), Morrison Hotel, Chicago, Ill.

14-20 American Petroleum Institute Oil Progress Week.

17-19 National Industrial Conference Board (atomic energy meeting), Waldorf-Astoria Hotel, New York, N. Y.

22-24 NLGI ANNUAL MEETING Edgewater Beach Hotel, Chicago, Ill.

29-30 Independent Petroleum Association of America (annual meeting) Statler Hotel, Dallas, Texas.

NOVEMBER, 1956

1-2 SAE National Diesel Engine Meeting, Drake Hotel, Chicago.

8-9 SAE National Fuels and Lubricants Meeting, The Mayo, Tulsa, Okla.

12-15 American Petroleum Institute (36th annual meeting), Conrad Hilton & Palmer House, Chicago, Ill.

26-30 National Exposition of Power and Mechanical Engineering (ASME), New Coliseum, New York, N. Y.

27-30 American Chemical Society (9th National Chemical Exposition), Cleveland, Ohio.

APRIL, 1957

16-18 National Petroleum Association, Cleveland, Ohio

JUNE, 1957

16-21 American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J.

SEPTEMBER, 1957

11-13 National Petroleum Association, Atlantic City, N. J.

OCTOBER, 1957

28-30 NLGI ANNUAL MEETING Edgewater Beach Hotel, Chicago, Ill.

APRIL, 1958

16-18 National Petroleum Association, Cleveland, Ohio

JUNE, 1958

22-28 ASTM 61st Annual Meeting, Hotel Statler, Boston, Mass.

SEPTEMBER, 1958

10-12 National Petroleum Association, Atlantic City, N. J.

OCTOBER, 1958

27-29 NLGI ANNUAL MEETING Edgewater Beach Hotel, Chicago, Ill.

Technical Committee

Chairman T. G. Roehner, Director of the Technical Service Department, Socony-Mobil Laboratories

Dr. H. L. Leland is making good progress in forming the Committee which will organize and conduct the 1956 Panel Discussion on "Lubrication of Ball Bearings." However, there is still time to register suggestions regarding kick-off speakers and like important details. Therefore, Technical Committee members are urged to write to him promptly and all suggestions will receive careful consideration.

So far as the Symposium to be held during the Wednesday Meeting of the Technical Committee is concerned, it has been practically decided that the subject will be "Laboratory Evaluations of Lubricating Greases for Automotive Ball Joint Front End Suspensions." The next step is to form a group who are particularly interested in this subject, and who will handle the many organizational details. Discussions during the 1955 Technical Committee Meeting indicated that a number of laboratories representative of both industries, namely car builders and lubricating grease manufacturers, had major projects in this field. One of the main objectives of the Symposium will be to provide a forum for discussion of results and thereby promote adoption of a common language for their interpretation.

NLGI Readies Annual Meeting Reservation Cards

Reservation cards for the NLGI annual meeting will be received in the mail soon . . . this gathering of grease experts will be at the Edgewater Beach hotel in Chicago during October 22-24 and two subjects taking top billing at the meeting . . . "Lubrication of Ball Bearings" and "Lubrication of Ball Joint Front End Suspensions" are already attracting large numbers for attendance. Since many have had to find accommodations outside the Edgewater Beach because of lack of space, it is suggested that members and subscribers act promptly when the reservation cards are received.

NLGI Welcomes Alpha Molykote as an Active Member

Continued from page 45

sale of lubricant-friction and wear testing machines. In this, the company is exceptionally qualified to be of real service to the lubrication field as a whole, because professional testing machine experience back up this effort, and its own research and development work on new lubricants provide a practical proving ground.

Some of Alpha's personnel, with a lifelong background in testing machine development, believe that professional testing machinery builders have completely neglected the lubrication field, which is one reason for the fact that no reliable research tools in the form of testing machines are available. Reviewing its own expenditures for lubricant research over the years, the company estimates that at least eighty per cent of the cost of such research is due to an almost unbelievable poverty in reliable testing equipment, a poverty which has no equal in any other industry.

The Company points to a statement from "A Review of Proceedings of the 4th World Petroleum Congress,"* expressing this view:

It has been shown that the results of laboratory apparatus for determining extreme bearing pressure properties (Almen, Falex, S.A.E., Timken, D.S. Tester, 4 Ball Tester) do not permit certain conclusions with reference to the behavior of lubricants in practical applications. Even reproducibility of results (with this equipment) leaves much to be desired. Experience over many years indicates that only full scale testing will furnish reliable results.

Alpha feels that the defeatist attitude expressed in the last sentence, while currently justified, need not be prolonged indefinitely. Its view is that full scale testing only adds to the complexity of lubrication research, while the machines mentioned above over-simplify it. Alpha's efforts will be directed towards developing a mean between the two and the study so far indicates that results may be expected soon.

**Schmiertechnik*—Jan/March 1956 Issue

LET US MODERNIZE YOUR PLANT

THE C. W. NOFSINGER CO.

Petroleum and Chemical Engineers

906 GRAND AVENUE KANSAS CITY 6, MO.

"In Engineering it's the People that count"

FOR SALE

One B-1405 Morehouse Mill, complete with deaerator and gear box. This equipment is practically new, at a substantially reduced price, and in good working condition. If interested write to NLGI SPOKESMAN, Box M-2 for further details.

CHEMIST WANTED

Wanted for research and development work in industrial petroleum lubricants by an Ohio company established over 50 years. Permanent position with opportunity for advancement, salary open and liberal benefits. Applicant should have degree, experience and be between 30 and 45 years of age. Initial response may be brief, reply to NLGI SPOKESMAN, Box M-1.

This will
TAKE THE "*SQUEAK*" OUT OF AMERICAN CARS *for a Long Time*

Shortly after this picture was taken, tons of lithium ore were processed into lithium hydroxide and sent to the grease industry for the production of more lithium base multipurpose grease. And this scene will be repeated over and over and over again. Foote Mineral's vast reserves of lithium ore will meet the ever increasing demands of the grease industry for many, many years to come.

Copies of an informative article on the manufacture and use of lithium base multipurpose grease are available upon request.

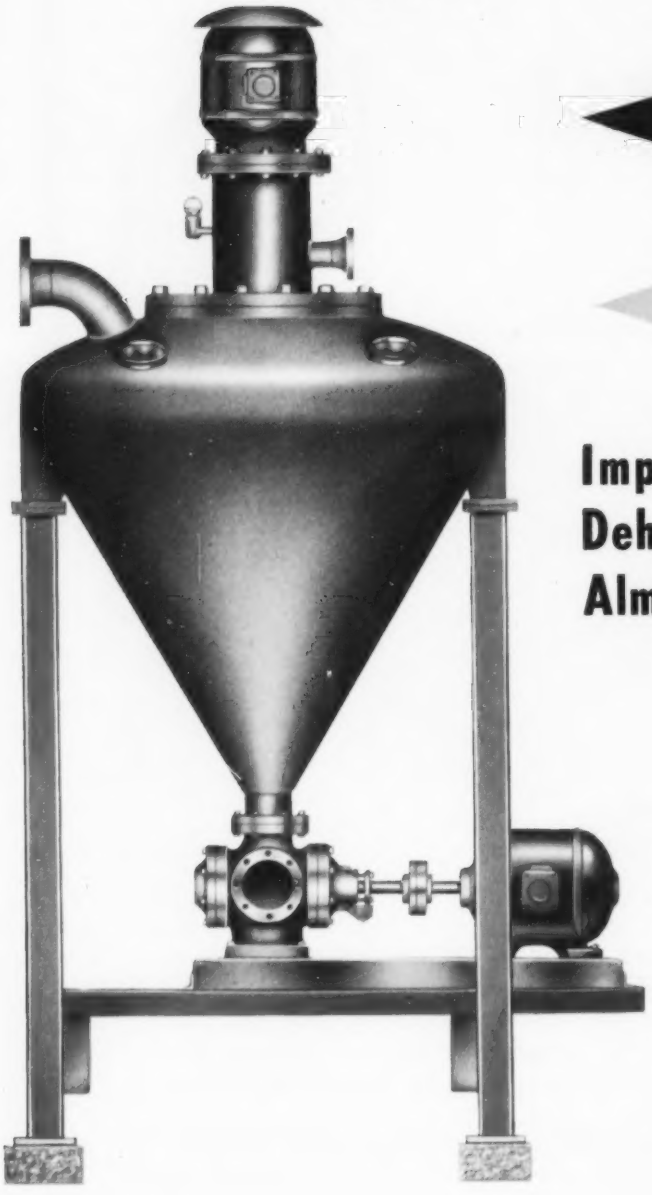
FOOTE MINERAL COMPANY
402 Eighteen West Chelten Building, Philadelphia 44, Pa.
RESEARCH LABORATORIES: Berwyn, Pa. • PLANTS: Exton, Pa./ Kings Mountain, N.C./ Sunbright, Va.

NEW

STRATCO
Reg. U. S. Pat. Off.

GREASE DEHYDRATOR

AND DEAERATOR



Improved Lower Cost Unit Dehydrates . . . Degasifies to Almost Any Desired Degree!

An entirely new development in more efficient, lower cost equipment for finishing greases after manufacture and milling. Brings all the advantages of the Stratco lube oil Flash Evaporator to the grease industry.

Exposes high velocity thin film of grease in vacuum zone for efficient release of water vapor and gases. Adjustable to almost any desired degree of dehydration and to complete deaeration. Nominal capacity 50 G.P.M. and adaptable to either batch or continuous manufacture.

Proved in commercial operation. Now available for existing or new plants, with Stratco or other equipment. Write us for complete details.

STRATFORD ENGINEERING Corporation

612 West 47th St. *PETROLEUM REFINING ENGINEERS* Kansas City 12, Mo.